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THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY

DEVOTED TO

NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

VOLUME VI 1903

EDITORS

ABEL JOEL GROUT AND ANNIE MORRILL SMITH

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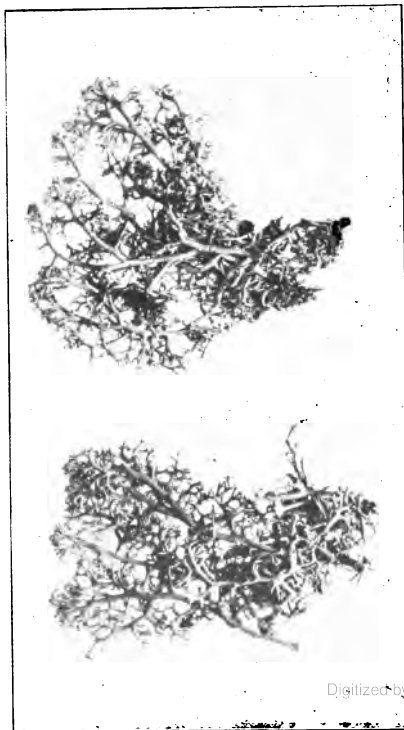
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No. 2.

NOTES ON CERTAIN CLADONIAS.

BY BRUCE FINK AND MABEL A. HUSBAND.

PLATE VII.

The western hemisphere surpasses the eastern in number of *Cladonias* and in number of species peculiar to the hemisphere, hence the genus should have a special interest for the American student of lichens. While this is true, it remains a fact that our American descriptions of *Cladonias* have been, without exception, wholly inadequate and many of our determinations consequently incorrect. *Cladonias* are the most variable of all of our lichens and therefore the most difficult to describe definitely. Fortunately, the most variable characters are those which may be studied with the eye or with a good hand lens, and yet nothing but the most careful observation will enable one to determine a *Cladonia* with any degree of certainty even with the best descriptions. Size, form, color, lobing and branching and the presence or absence of cortex and soredia must be constantly kept in mind in the consideration of the horizontal thallus and yet more in the study of the podetia.

As to microscopic examination, it may be said that the spores, usually of considerable importance in determination, are here so constant in size and form that they may usually be neglected in descriptions. The same may be said of the algal cells. The so-called hypothallus is seldom seen and is of no use in the determination of *Cladonias*. Also those doubtful structures, the spermagones and the spermatia may be entirely neglected, while there is serious doubt as to the diagnostic value of chemical tests in the determination of any lichens. The minute anatomy of the thallus may yet be found to have some value in determination, but our investigations do not indicate that it is of sufficient importance to warrant adding to the necessarily long descriptions of such variable plants as the *Cladonias*.

With this short preliminary statement let us pass to the consideration of a few of the species; and we make no plea for beginning with the more conspicuous and better known *Cladonias*, for there is urgent need for careful study of every species. It is hoped that good descriptions of a few *Cladonias* may enable those interested in these plants to observe some characters usually quite overlooked. We have selected for description a number of *Cladonias* that are very commonly confused by American lichenists.

CLADONIA RANGIFERINA (L.) Web. in Wigger's Prin. Fl. Hols. 90. 1780.

Primary thallus rarely developed, when present crustaceous, delicate and composed of subglobose, depressed or irregular, clustered or scattered verrucae, which are .20-.40 mm. in diameter, ashy white and destitute of cortical layer. Podetia, without cortex, arising from the surface of the verrucae, or often as branches of old or dying podetia, or from free fragments

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of old podetia, dying at the base and increasing in length at the top, 30–200 mm. long and .7–3 mm. in diameter, subcylindrical and cupless, subdichotomously or subradiately branched, the short branches usually unilaterally deflexed and their axils somewhat dilated and frequently perforate, erect or rarely ascending or even decumbent, clustered or often confusingly subsolitary among other lichens, grayish or grayish-brown, the apices subulate and furcellate, the sterile ones commonly nutant and often brownish. Apothecia small, .5–2 mm. in diameter, corymbose, solitary or clustered at the apices of the branches, immarginate, convex, the disk commonly brown. Hypothecium colorless or the sub-hymenial portion brownish. Hymenium brown above and pale-brownish below. Paraphyses usually simple, thickened at the pale or brownish apex. Asci cylindrico-clavate, the apical wall thickened. (Fig. 1.)

The plant grows on earth and over rocks covered by more or less humus. It also occurs in a degenerate condition on old wood. It is our largest *Cladonia*, single clusters being often three feet in diameter and standing a foot high in the most favorable habitats in northern regions. This lichen is known in nearly every part of all the continents.

CLADONIA SYLVATICA (L.) Hoffm. Deutschl. Fl. 114, 1796.

Primary thallus rarely developed, when present crustaceous, delicate and composed of subglobose scattered or clustered verrucae, which are .12–.48 mm. in diameter, straw-gold colored and destitute of a cortical layer. Podetia without cortex, commonly formed from branches of old or dying podetia or rarely arising from the verrucae of the primary thallus, dying at the base and increasing in length at the top, 30–150 mm. long and .5–4.5 mm. in diameter, cylindrical or subcylindrical, cupless, frequently somewhat dilated in the axils which are often perforate, dichotomously or finally sympodially or radiately branched, one or two radii becoming larger and erect, the others short and usually unilaterally or irregularly fasciculate and deflexed, the upper branches not much shortened and forming loose clusters, growing in dense clusters or subsolitary among other lichens and mosses, erect or rarely ascending or decumbent, often minutely webby-tomentose, whitish or yellow-straw-colored, or light sea-green, apices subulate and very minutely radiate or furcate spinous, the upper sterile ones often more or less nutant and especially these upper ones frequently brown or brownish. Apothecia small, .5–1.2 mm. in diameter, arranged in corymbs, solitary or clustered at the apices of the branches, having at first a very thin margin and finally immarginate, convex or depressed convex, the disk brown. Hypothecium almost colorless or the subhymenial portion brownish. Hymenium brownish above and pale or pale-brownish below. Paraphyses usually simple, somewhat thickened at the pale or brownish apex. Asci clavate with walls thickened at the apex. (Fig. 2).

This lichen grows with the last and is very closely related to it. The American and foreign distribution of the two is about the same, and they are found growing in the same clusters in a most confusing way. However, the first plant described is somewhat larger as a rule, the branching is

somewhat different, the tomentose condition scarcely marked, the color of the thallus on the whole duller and the spinous apices of the branches absent.

CLADONIA SYLVATICA (L.) Hoffm. var. *LAXIUSCULA* (Del.) Wainio Mon. Clad. Univ. 1:29. 1887.

Podetia slender, quite long, abundantly dichotomously and sparingly radiately branched, the sterile apices nutant. Determined from Minnesota by Dr. Wainio. Apparently new to America and little known in Europe.

CLADONIA SYLVATICA (L.) Hoffm. var. *SYLVESTRIS* (Oed.) Wainio Mon. Clad. Univ. 1:20. 1886.

The more tomentose condition, having rather more slender podetia and the apices of the branches more inclined to be straight.

This variety was determined for us from Minnesota by Dr. E. Wainio. It is doubtless widely distributed in America, though it has seldom been distinguished from the usual form of the species. Dr. Wainio has also given us the name *CLADONIA SYLVATICA* (L.) Hoffm. var. *PUMILA* (Ach.) Del. in Dub. Bot. Gall. 621. 1830, but the plant seems to be simply a small form of the above variety.

CLADONIA ALPESTRIS (L.) Rabenh. Clad. Eur. Exsic. 11. 1860.

Primary thallus rarely developed, when present crustaceous, delicate and consisting of subglobose or irregular, clustered or scattered verrucae, which are .16-.28 mm. in diameter, straw-colored and destitute of a cortical layer. Podetia arising from the verrucae of the primary thallus or often from old or dying podetia or from free fragments of dying podetia, dying at the base and increasing in length at the top, 50-200 mm. long and .5-2.5 mm. in diameter, subcylindrical, often somewhat dilated in the axils, cupless, subdichotomously or more commonly radiately or fasciculate branched, frequently from four to six branches surrounding a perforation in the axil, one or more branches becoming erect and larger, the others remaining short and becoming finally unilaterally fasciculate and deflexed, the upper branches shorter and forming dense thryses, cæspitously clustered, erect, without cortex and more or less webby-tomentose, whitish or yellowish straw-colored, the apices subulate and frequently spinous, more commonly straight and sometimes colored brown. Apothecia small, .3-.5 mm. in diameter, disposed in dense corymbs at the apices of the branches, solitary, clustered or confluent, at first thin margined, finally immarginate, convex, the disk brown (or brick-red?). Hypothecium pale or pale brownish. Hymenium brownish above and pale below. Paraphyses simple or rarely branched, sometimes enlarged toward the apex. Asci clavate to cylindrico-clavate, the apical wall thickened. (Fig. 3).

Occurs with the two species above described, frequently intermingled in the same clusters and is more beautiful in color, delicacy of branching and arrangement of clusters than either of them. The three lichens are very closely related, and only the most careful study will enable one to distinguish the best marked forms, to say nothing of a multiplicity of intermediate con-

ditions. The usual absence of the primary thallus and the peculiar origin of what may be called secondary podetia from other podetia, the dying away at the base and the frequent great luxuriance are characters common to the three species. The last one, like the other two, has a wide American and foreign distribution, but it is more confined to cold regions than the first two.

CLADONIA AMAUROCRAEA (L.) Schaer. Lich. Helv. 34. 1823.

Primary thallus usually disappearing early, composed of small usually ascending squamules, which are .5-1.7 mm. long and .16-.29 mm. wide, crenate or digitate-incised, scattered or clustered, sea-green above and whitish below and covered by a continuous cortical layer. Podetia usually arising from old podetia, from free fragments of old podetia or rarely from the surface of the primary thallus, dying at the base and increasing in length at the top, 15-120 mm. long and .5-3 mm. in diameter, cupless and subcylindrical or more rarely cup-bearing, dichotomously, radiately or rarely irregularly or fasciculate branched, the axils closed or rarely perforate, branches spreading, the apices tapering and subulate and terminated by spines, cymose branchlets or cups, forming larger or smaller clusters, erect ascending or decumbent with straight apices, having a continuous or areolate cortex, without squamules or sparsely squamulose toward the base, straw-colored to sea-green or rarely whitish between the areoles of the cortex, usually brownish toward the apices, the basal dead portions frequently of a darker color. Cups quite abruptly dilated and becoming 5 mm. in diameter, perforate or imperforate, frequently oblique, the margin finally spinous or radiately proliferous. Apothecia of medium size, .7-3 mm. in diameter, solitary or clustered at the apices of the branches, thinly margined or at length immarginate, plane or convex, sometimes perforate and lobed, the disk pale to brown (or even brick-red?). Hypothecium pale. Hymenium brownish above and pale or yellowish below. Paraphyses simple or rarely branched and scarcely thickened at the pale or brownish apex. Asci cylindric-clavate, the apical wall thickened. (Fig. 4).

Common in the extreme northern portion of the United States and Canada, but found further south only in the mountains. Grows on earth and on rocks covered by humus. Also widely distributed in foreign lands, but confined to cold regions. The plant is frequently confused with forms of *Cladonia furcata* and yet more frequently with the next below.

CLADONIA UNCIALIS (L.) Web in Wigger's Prim. Fl. Hols. 90. 1780.

Primary thallus usually disappearing early, composed of small, usually ascending squamules, which are .5-1 mm. long and .08-.15 mm. wide, crenate or incised-crenate, clustered or scattered, sea-green to straw-colored above and whitish below, having a continuous cortical layer. Podetia usually arising from old or dying branches or fragments of podetia or rarely from the margin of the primary thallus, dying at the base and increasing in length at the top, 25-100 mm. long and 1-3.5 mm. in diameter, cupless and subcylindrical, sometimes slightly dilated in the axils, dichotomously, sympodially or radiately branched, branches all elongated or some of them short

and all more or less spreading, erect, ascending or decumbent, axils frequently perforate and the sides of the podetia also rarely perforate, cortex subcontinuous or areolate, the areoles smooth or somewhat raised, destitute of squamules, straw-colored to sea-green or the decorticate portions between the areoles white, the dead portion below frequently darker, the apices subulate and straight and frequently spinous and not infrequently brownish. Apothecia small, .5-.9 mm. in diameter, solitary or clustered at the ends of short radiately or cymosely arranged apices, thinly margined or without margin, plane or somewhat convex, the disk pale to brown. Hypothecium pale or colorless. Hymenium brownish above and pale or pale-brownish below. Paraphyses simple, rarely cohering, the pale apices very slightly thickened. Asci clavate or cylindrico-clavate, the apical wall thickened. (Fig. 5).

Grows on earth or on rocks covered by humus. The plant is found in all parts of North America and is quite cosmopolitan in its foreign distribution also. The species is usually a shorter plant than the last with rather stouter podetia, whose apices are rather more obtuse. Yet in northern regions where both species occur, the shorter cupless conditions of the last frequently seem to pass into the present species.

CLADONIA UNCIALIS (L.) Web. var. OBTUSATA (Ach.) Nyl. Syn. Meth. Lich. 215. 1860.

The plant of Acharius was of the usual size with minute axillary perforations, was densely radiate-branched and had obtuse more or less spinous summits. Ours from Oak Island, Lake of the Woods, and determined by Dr. Wainio, is a stout plant, the podetia reaching 3 or 4 mm. in diameter. The axillary perforations are by no means minute, and the summits of the branches are scarcely spinous, though quite obtuse. The podetia reach 65 mm. in length. The specimen is well supplied with small apothecia and seems very near *Cladonia Boryi*, Tuck. Known in Europe, but not previously reported from America so far as we know. Perhaps *Cladonia uncialis* (L.) Web var. *turgescens* (Schaer.) Del. in Dub. Bot. Gall. 620. 1830, and *Cladonia uncialis* (L.) Web. var. *dilacerata* Leight. Not. Lich. Richards, 191. 1866, should be noticed as both have been reported from North America.

CLADONIA CENOTEA (Ach.) Schaer. Lich. Helv. 35. 1823.

Primary thallus persistent or finally disappearing, composed of middling sized, irregularly or subdigitately incised, more or less ascending, flat or involute, clustered or scattered squamules, which are whitish, sea-green, brownish or olivaceous, 1-3.5 mm. long and .10-.30 mm. wide. Podetia arising from the surface of the primary thallus, sometimes dying at the base but slowly increasing in length at the top, 10-85 mm. long and .5-4 mm. in diameter, cylindrical, turbinate or irregularly turgescent, commonly erect, cup-bearing, decorticate and sorediate or corticate toward the base, without squamules or squamulose toward the base, white, ashy, sea-green or brownish or these colors variegated, the lower dead portion usually darker, the sides and the apices usually perforate. Cups 2-8 mm. in diameter, commonly perforate, becoming repeatedly proliferate. Apothecia small,

and rare in ours, .5–1.5 mm. in diameter, subsolitary or more or less clustered on the margins of the cups or at the apices of the branches, most commonly immarginate, plane to convex, often perforate, the disk flesh-colored to brown. Hypothecium pale or pale-brownish. Hymenium brownish or pale above and pale or pale-brownish below. Paraphyses often thickened and sometimes branched toward the pale apex. Asci clavate, the apical wall thickened, commonly containing six spores. (Fig. 6).

Grows on earth or old wood, and in the western hemisphere is confined to the northern half of North America, including the extreme northern part of the United States. Common to all the grand divisions of the eastern hemisphere. Certain conditions are sometimes confused with the last species, but more commonly with the next below. Dr. Wainio has referred one of Tuckerman's specimens, (Tuck. Lich. Amer. Exsic. no. 125. 1854) to *Cladonia cenotea* (Ach.) Schaer. var. *crossota* (Ach.) Nyl. Lich. Scand. 57. 1861, and gives description, which in absence of specimen conveys no distinct idea.

CLADONIA TURGIDA (Ehrh.) Hoffm. Deutschl. Fl. 124. 1796.

Primary thallus persistent or finally disappearing, composed of large foliose squamules, which are irregularly or subdichotomously lobate or laciniate, erect or ascending, plane, convex or convex and involute, often closely clustered, whitish to pale sea-green above and white below, having a continuous cortex, 5–20 mm. long and 2–5 mm. wide. Podetia arising one or more from the surface of any squamule of the primary thallus, sometimes dying at the base and rarely increasing in length at the top, 20–75 mm. long and 1.5–3.5 mm. in diameter, turgescant and turbinate or subcylindrical, sometimes rather obsoletely cup-bearing, radiately or dichotomously branched, the branches erect or spreading, axils and also the sides frequently perforate or even gaping, erect or ascending, cortex subcontinuous or areolate, sometimes more or less squamulose, whitish to whitish-sea-green or the decorticate portions between the areoles white, the basal dead portion sometimes becoming brown, the cupless apices obtuse or shortly radiate or furcate and frequently becoming brown. Cups slightly dilated, perforate or closed and rarely cribose, the margin radiate-proliferous. Apothecia small or middling sized, .5–2 mm. in diameter, solitary or clustered at the ends of the branches and frequently short stipitate, thinly margined or immarginate, plane or convex, often lobed and perforate, the disk brown (or brick-red?). Hypothecium pale or pale-brownish. Hymenium pale brown above and pale or pale-brownish below. Paraphyses somewhat clavate toward the pale or brownish apex. Asci cylindrical to clavate, the apical wall thickened. (Fig. 7).

Occurs on earth or on rocks covered with humus. Known in the northern part of North America and in northern Europe and extending further south in mountains. Found in northern United States as well as further north. Easily confused with either of the last two plants. *Cladonia turgida* (Ehrh.) Hoffm. var. *grypha* Tuck. Enum. Lich. in Agass. Lake Super, 173. 1850. may be distinct. This variety is described in Tuckerman's

Synopsis under the name, *Cladonia turgida* (Ehrh.) Hoffm. var. *conspicua* (Schaer.) Nyl. Addit. Fl. Chil. 147. 1855. The primary thallus is usually wanting, the podetia elongated and sometimes quite squamulose.

In closing some explanation of a few expressions used above will be helpful. Our sea-green is a grayish green or perhaps nearer a gray than a green. Single cells or hyphae which are hyaline, when seen collectively as in an hymenium or an hypothecium, are of a whitish color, which we have called pale. Paraphyses of *Cladonias* are hyaline except at the tips.

Even water will sometimes causes the coloring matter of the epithecium to diffuse through the hymenium, especially the upper portion, in sections. To avoid error from this source, sections must be examined as to color the moment after cutting.

Fayette, Iowa.

HEPATICÆ—LEJEUNEA.

WILLIAM C. BARBOUR.

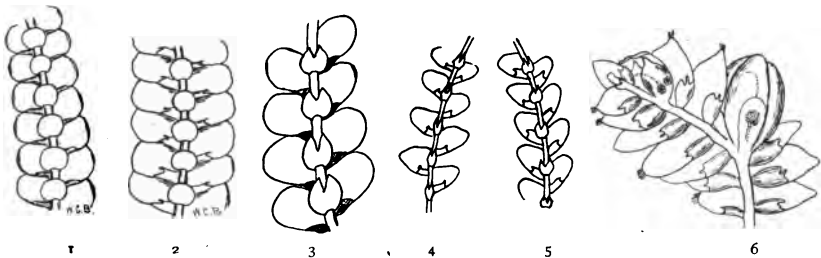


Fig. 1. *Archilejeunea clypeata* Fig. 2. *A. Sellowiana* Fig. 3. *Lejeunea Americana* Fig. 4. *Microlejeunea lucens* Fig. 5. *M. Ruthii* Fig. 6. *Cololejeunea Jooriana*

The genus *Lejeunea* was founded by Libert, and as such was accepted by Spruce and many other writers. If considered as a single genus it is a very large one, and was divided by Spruce into thirty-seven subgenera. Most of these were raised to the rank of genera by Schiffner when, in 1893, he issued the Hepatic part of Engler and Prantl's *Natur Pflanzenfamilien*.

We shall endeavor to adapt from older works a description of the genus which shall cover the composite *Lejeunea* as covering all these divisions. The descriptions of species are adapted and simplified from the monograph by A. W. Evans, of Yale University, published in Volume VIII., No. 2, *Memoirs of the Torrey Botanical Club*. Most of the illustrations were redrawn from the same source. Dr. Evans admits to the flora of the United States and Canada twenty-three species, of which about ten occur in the "Gray's Manual Region."

Of the thirteen species not here included, seven are found in various States of the South, including Florida; five in Florida only; and one, *Colelejeunea Macounii* (Spruce) Evans, occurs in British Columbia. Of the species here noted, one, *Lejeunea patens* Lindb. is found in Newfoundland and Nova Scotia. The other occurs at various points in the Northeastern States.

In temperate regions the number of species found is comparatively small, while in the tropics the genus reaches proportions which are alarm-

ing to the amateur. Many of our species of the extreme South are merely the northern limits of those which are common in the warmer regions of Mexico and the West Indies.

LEJEUNEA belongs to those leafy stemmed hepatics which have the bilobed leaves, or leaves folded together so as to make a dorsal and a ventral lobe. The ventral lobe in this genus is incurved, but not ligulate or saccate. The lower lobe is always smaller than the upper and is usually more or less inflated. It is separate from *Radula* in that the root hairs arise from the stem or underleaves, whereas in *Radula* they arise from the ventral lobes. Also in *Radula* the perianth is compressed while in *Lejeunea* it is angular. *Frullania* and *Jubula* have the ventral lobe saccate, while in *Porella* it is ligulate. The leaves are decurrent at the folds, and, in all but two of our northeastern species, underleaves are present. The perianth is free from the involueral leaves oval or oblong, terete or angular, and with the mouth carinate, cristate, or ciliate. Capsule globose. Spores large, tuberculate.

Our *Lejeunea* are rather smaller than the other genera which we have considered, except *Frullania*, which they greatly resemble in appearance to the unaided eye. In habitat, they grow at the base of trees, upon their bark, upon rotten logs, and some upon rocks. Sometimes species are mixed together, or mixed with other hepatics or mosses, so that care should be taken in identification.

KEY TO SPECIES.

1. Underleaves present, undivided.....2.
Underleaves present, bifid3.
Underleave absent.....8,
2. Lobule bluntly pointed at apex.....*Archilejeunea clypeata*.
Lobule with long and slender apical tooth.....*Archilejeunea Sellowiana*.
3. Lobe acute, underleaves with rounded divisions, and broad shallow sinus.....*Harpalejeunea ovata*.
Lobe rounded or obtuse, underleaves obtuse to acute divisions, and narrow sinus.....4.
4. Lobe widely spreading, inflorescens autoicous.5.
Lobe obliquely spreading to suberect, inflorescence dioicous.....7.
5. Lobes and underleaves distinctly crenulate.....*Lejeunea patens*.
Lobes and underleaves entire or nearly so6.
6. Underleaves not rounded at base, perianth abruptly narrowed at base,.....*Lejeunea cavifolia*.
Underleaves rounded at base, perianth gradually narrowed toward the base*Lejeunea Americana*.
7. Underleaves longer than broad, deeply bifid, often unidentate on sides.....*Microlejeunea lucens*.
Underleaves broad as long, bifid to middle, never unidentate on sides*Microlejeunea Ruthii*.
8. Outer surface of lobe rough from projecting cells or wart-like thickenings, no hyaline cells.....*Cololejeunea Biddlecomiae*.
Outer surface of lobe almost smooth, cells scantily convex, hyaline cells often present at apex and along antical margin.
Cololejeunea Jooriana.

ARCHILEJEUNEA CLYPEATA (Schwein.) Schiffn. (*Phragmicoma clypeata* Nees) (*Lejeunea clypeata* Sull.). Fig. 1.

Plant pale green, growing in broad mats; stems irregularly branched: leaves imbricated, dorsal lobe obliquely spreading, broadly oblong; apex rounded: margin crenulate from projecting cells; ventral lobe ovate-triangular, inflated, apex blunt, junction of lobes forming an obtuse angle: underleaves distant, orbicular, rounded at the apex, abruptly narrowed at base, very short decurrent: inflorescence autoicous or dioicous: female inflorescence borne on a principal branch; bracts complicate, unequally bifid, scarcely or not at all winged on keel, lobe obovate, rounded at apex, crenulate, lobule oblong, rounded at apex; bracteole ovate-oblong, narrowed at base, truncate or retuse at apex; perianth obovoid, truncate with a short broad beak, five keeled, keels roughened: male spikes on short branches, oblong; antheridia in pairs.

This species occurs on rocks and trees, and ranges from Connecticut to Georgia and Louisiana. It has been distributed in Musci Alleg. 262, and in Hep. Bor. Amer. 95, as *Phragmicoma clypeata*. Also in Hep. Am. 50, as *Lejeunea clypeata*.

ARCHILEJEUNEA SELLOWIANA Steph. (*Phragmicoma xanthocarpa* Aust.) (*Lejeunea velata* Gottsche.) Fig. 2.

Plants pale green or glaucous, in wide mats: stems closely appressed to matrix: leaves closely imbricated, the dorsal lobe widely spreading at nearly right angles with the stem, ovate-oblong, apex rounded, margin entire or nearly so, lower margin arching across stem; lobule inflated toward base, oblong, apex acuminate, sometimes curved, ending in a tooth three to eight cells long, two to four cells wide at base and with a single row of cells at apex; lobules on small branches often poorly developed: underleaves broadly orbicular to reniform, rounded, truncate or retuse at apex, rounded at base: inflorescence autoicous; female on short branch usually, bracts complicate, unequally bifid; perianth obovoid, half exerted, broad and truncate above, with short, narrow beak, five-keeled, keels roughened: male spikes similar to *A. clypeata*. Found on trees and rocks. Range from Rhode Island to Tennessee, south to Florida and Texas. Distributed in Hep. Bor. Am. 95b. as *Phragmicoma xanthocarpa*.

HARPALEJEUNEA OVATA (Hook.) Schiffn. (*Lejeunea ovata* Tayl.) (*Lejeunea Molleri* Steph.)

Plants pale to dark green, loosely caespitose or scattered: stems prostrate, closely appressed: leaves contiguous or somewhat imbricated, lobe spreading, gradually narrowed beyond middle, apex often reflexed, usually acute, margin nearly entire; lobule (ventral lobe) strongly inflated, ovoid, keel strongly arched, crenulate from convex cells: apex with a single projecting cell: underleaves distant, broadly cuneiform, apex broad, truncate or emarginate with a shallow sinus, rounded or obtuse segments, margin entire: inflorescence dioicous; female on a leading branch; bracts as before; perianth obovate-clavate, acutely five-keeled in upper part: male spike on short branch.

On trees and fallen logs. Virginia, Tennessee, and Georgia. It is also found in Western Europe, and the type specimen was collected in Ireland by Taylor. Fruiting material is rare. The acute lobes of its leaves and the emarginate-bifid underleaves with rounded divisions distinguish it from all other *Lejeuneæ* of the United States. In the tropics, however, it has an abundance of relatives.

LEJEUNEA PATENS Lindb.

Plants pale or dark green, slightly glossy when dry, caespitose: stems copiously branched: leaves imbricated, the lobe ovate, widely spreading, strongly convex, rounded and decurved at apex, margin distinctly crenulate from projecting cells, antical margin arching across the stem; lobule strongly inflated, ovate, mostly crenulate, apex tipped with a single blunt, projecting cell; cells of lobe convex: underleaves distant, about the size of or a little smaller than the lobules, orbicular, gradually narrowed to base, bifid about one-half, apex of lobes varying from obtuse to acute, sinus varying from acute to obtuse, margin crenulate: inflorescence autoicous: female sometimes on leading branch, sometimes on short one; perianth half exerted, oblong-obovoid, gradually narrowed toward base, rounded above and with short beak, terete below, sharply five-keeled above, keels crenulate from projecting cells, becoming blunter with age: male spike on short branch; antheridia in pairs. Found on rocks. Localities:—Ireland (type—Lindberg), Great Britain, Norway; and, in America, Newfoundland and Nova Scotia. May be found in northern borders of the United States, or in mountainous regions.

LEJEUNEA CAVIFOLIA (Ehrh.) Lindb. (*Lejeunea serpyllifolia*, Lib.) (*L. serpyllifolia* var. *cavifolia* Lindb.) (*L. serpyllifolia* var. *Americana*, Lindb., in part.) (*Eulejeunea serpyllifolia* Schiffn.),

Plants pale to dark green, dull or glossy when dry, in tufts or creeping over other bryophytes: branches spreading, usually abundant: leaves imbricated, lobes ovate, obliquely spreading, rounded to obtuse at apex, margin entire or nearly so; lobule strongly inflated, ovate, scarcely crenulate: underleaves distant, as large as or a little larger than the lobule, ovate-orbicular, gradually narrowed toward base, neither decurrent or rounded, bifid about one-half with rounded to acute lobes, margin entire or nearly so: inflorescence autoicous; female on leading branch, sometimes on short branch; perianth about half exerted, oblong to oval-oblong from narrowed base, rounded or truncate at apex with short, slender beak, terete below, sharply keeled in upper part, the keels smooth.

This plant grows on rocks and trees. The range is from Ontario, New Hampshire and Pennsylvania, to Minnesota and Wisconsin. Has been distributed in Hep. Bor. Am. 97 (in part), and in Hep. Am. 8 (As *Lejeunea serpyllifolia*).

LEJEUNEA AMERICANA (Lind.) Evans (*Lejeunea serpyllifolia* var. *Americana* Lindb.—in part.) Fig. 3.

Pale, whitish or yellowish green, closely appressed or in depressed mats: stems irregularly pinnately branched: leaves imbricate, the lobe ovate, widely spreading, rounded to obtuse at apex, margin entire or

slightly crenulate; lobule inflated, ovate, scarcely crenulate, apex with a single projecting cell: underleaves contiguous or sub-imbricate, a little larger than lobule, orbicular, rounded or sub-cordate at base; bifid about one-half, segments usually acute or apiculate, occasionally obtuse, sinus acute to obtuse, margin entire or sinuate: inflorescence autoicous; female on leading or short branch; perianth obovoid, often distinctly dilated above middle, gradually narrowed toward base, broad and truncate above, and with a short beak, terete below, sharply five-keeled above, keels smooth: male inflorescence usually on short branch: spores greenish, angular, thick-walled. Grows on trees. Ranges from North Carolina to Florida, westward to Louisiana and Texas. Has been distributed in Drummond's Southern Mosses 171, in part; Musc. Allegh. 272 (as *L. serpyllifolia*); Hep. Bor. Am. 97, in part (as *L. cavifolia*); Hep Am. 98 (as *L. Austini*.); Hep. Amer. 137 (as *L. lucens*.).

MICROLEJEUNEA LUCENS (Tayl.) Evans (*Lejeunea lucens* Tayl.) Fig. 4.

Pale green, scattered or in turfs: leaves distant to imbricated, lobe obliquely spreading, ovate, apex rounded varying to obtuse, margin entire or subcrenulate from projecting cells; lobule half as long as lobe, strongly inflated, ovoid; lobule often poorly developed: underleaves distant, ovate narrowed toward base, not decurrent, bifid to about the middle, with subulate to acuminate divisions ending in a single cell or in a row of two cells, sinus narrow and obtuse: inflorescence dioicous; female on short branches; bracts complicate, nearly equally bifid; perianth scarcely exerted, broadly pyriform, slightly compressed, five-keeled, the keels smooth, the beak short: male spike julaceous, at base of an elongated branch. On trees or moist rocks. Virginia, Florida, Mississippi, Louisiana. Throughout tropical America. Was distributed in Sull. Musci Alleg. No. 274, as *Lejeunea cucullata*; and in Hep. Bor. Am. No. 98, under same name.

MICROLEJEUNEA RUTHII Evans Fig. 5.

Pale or dull green, scattered or loosely caespitose, sparingly and irregularly branched, the branches widely spreading: leaves distant to loosely imbricated, the lobe obliquely spreading to suberect, ovate or broadly ovate, rounded at apex, margin nearly entire, sometimes slightly angular-sinuate; lobule half the length of lobe, strongly inflated, ovoid, apex tipped with a single projecting cell which is sometimes outwardly curved: underleaves distant, orbicular, narrowed toward base, and neither rounded nor decurrent, bifid to about middle with broad, suberect, triangular lobes and obtuse sinus, lobes acute, ending in single cell or row of two cells, margin entire or subcrenulate from the projecting cells, lateral margins rounded: inflorescence dioicous; female on a leading branch, bracts complicate, deeply and unequally bifid; bracteole free, ovate from an abruptly contracted base: perianth and male inflorescence as yet unknown. Known only from the type locality, Big Frog Mountain, Tennessee. The original description is in Mem. Torr. Bot. Club, 8:161. 1902. The species is near *M. ulicina* Tayl. of Europe. It somewhat resembles *M. lucens*, from which it may be distinguished by the less widely spreading lobes of its leaves, smaller cells with thicker walls, broader underleaves, which have broader segments and are

never unidentate on sides, by male spike on leading branch instead of short branch.

COLOLEJEUNEA BIDDLECOMIAE (Aust.) Evans (*Lejeunea calcarea* of Sull., not of Libert.) (*Lejeunea echinata* of Aust., not of Taylor.) (*Lejeunea Biddlecomiae* Aust.)

Pale or bright green, scattered or depressed caespitose: irregularly pinnately branched: leaves distant to imbricated, lobe obliquely to widely spreading, ovate, apex varying from rounded to acute, usually obtuse, margin crenulate or denticulate from projecting cells; lobule inflated, ovoid to globose, keel bearing an obtuse, sometimes indistinct tooth beyond the middle, and another tooth composed of two cells midway between this tooth and end of keel; stylus conspicuous, composed of two to ten cells in a single row, sometimes two cells broad a part of its length; inflorescence dioicous or autoicous; female on a leading branch, bracts unequally bifid, the lobe obliquely spreading, broadly ovate; perianth partly exserted, obovoid to oblong, not compressed, rounded to truncate at the apex, with a short beak sharply five-keeled in upper part, surface roughened from projecting cells, except near base: male spikes on leading branches; bracts similar to leaves, but with proportionately larger lobule; antheridia singly or in pairs. On trees and rocks. Range from Ontario and Massachusetts to Alabama and Florida. Distributed in Sull. Musci Allegh. 275 (as *Lejeunea calcarea*). Aust. Hep. Bor. Am. 99 (as *Lejeunea echinata*). Hep. Amer. 51 (as *L. calcarea*). Can. Hep. 13 (as *L. calcarea*). Found best developed on trees especially in swamps. A tiny species, when dry hardly noticeable to the unaided eye; leaves $\frac{1}{2}$ mm. long.

COLOLEJEUNEA JOORIANA (Aust.) Evans. (*Lejeunea Jooriana* Aust.) Fig. 6.

Yellowish green or whitish, darker with age, scattered or loosely caespitose: irregularly pinnately branched: leaves imbricated, lobe widely spreading, ovate, gradually narrowed from just below middle to the rounded, obtuse or subacute apex, margin entire or subcrenulate; lobule inflated, ovoid, free margin with two teeth as in last species; stylus inconspicuous and soon obsolete, composed of two cells in a row or even of a one-celled papilla; cells scarcely convex; hyaline cells at apex one to ten in number, elongated, usually in a single row, their ends usually free, hyaline cells sometimes also along the antical margin, usually becoming indistinct with age; inflorescence synoicous or sometimes paroicous; female usually on a leading branch, rarely on short branch; bracts similar to leaves, with more or less inflated lobule, stylus three to four cells long sometimes; perianth half exserted, broadly ovoid to obvoid, rounded at base, rounded, truncate or slightly retuse at apex, with extremely short and indistinct base, somewhat flattened, antical face plane or with broad, low keel, lateral keels sharp to blunt, postical keel broad and two angled: antheridia borne singly or in pairs in the axils of the female bracts; spores elongated, angular, greenish. On bark and reed. North Carolina, Florida, Louisiana, Differs from *C. Biddlecomiae* in its ordinary leaf cells which are plane or nearly so, also in its inflorescence, hyaline cells, and much shorter stylus.

Sayre, Pa.

KARL GUSTAVE LIMPRICHT. SECOND PART.

BY JOHN M. HOLZINGER.

Since writing the above (see *THE BRYOLOGIST* for January, 1903,) I have received the following data, which will correct and enlarge our knowledge regarding Mr. Limpricht. For this information I am indebted to Dr. Paul Richter, editor of the entire work of Rabenhorst's *Cryptogamen-Flora*, to whom all moss students will be grateful for so much interesting information about the author in question.

My question having been addressed to Mr. Eduard Kummer, the publisher, regarding the completion of the *Laubmoose*, Dr. Richter informs me, first, that the work will be brought to a fitting close by the son, Dr. Wolfgang Limpricht, who is also a botanist. The work yet to be finished includes the supplements to half of Volume II., and to all of Volume III. For this there are in hand many drawings by the author. Then will come the index including synonyms for the entire work, which the author's son will also furnish.

Part 38 is now in press and will be published before the end of the year (1902). It contains supplementary data to parts 14-26, that is, to Volume II. Next year (1903) part 39 will close the entire work, and an additional number will contain the general index.

The following additional data are of interest. Mr. Limpricht was the son of a gardener and nursery owner in Eckersdorf near Sagan in Prussian Silesia. From 1853 to 1856 he completed his studies in the Normal School of Bunzlau, Silesia. With the recommendation of ranking first in his class he found a position as teacher in Obergläserdorf near Lüben in Silesia. In 1858 he was called to teach in the higher Ladies' Seminary in Bunzlau, where he found leisure to delve with zeal and with success into the study of the natural sciences. Much inspiration in his efforts came to him from his Normal School teacher, subsequently Privy Counsellor, W. Prange, the well-known Silesian botanist, R. von Wechtritz, and Professor Göppert in Breslau. From these men he received much encouragement to take up botanical studies, and it was through their influence that he was in 1869 given the position of teacher of the natural sciences in the higher schools in Breslau. Here he was in 1871 introduced into the study of mosses by Professor J. Milde. From that time on this was to be his special field of labor.

At the University in Breslau he found further incentive to scientific pursuits in his friendly association with Professors Göppert and Ferdinand Cohn, both original investigators who in their special lines in Botany command leading positions. Besides his principal work as teacher in the High School he was special instructor in the descriptive natural sciences in a special school at Breslau for improving teachers and preceptresses, also custodian for the Silesian Society for Popular Culture. He was also a corresponding member in several scientific societies, both domestic and foreign. In recognition of his scientific services the school authorities elected him in 1897 to the principalship of the schools where he had taught so long and so successfully.

The following is a list of Mr. Limpricht's bryological labors:

1. *Bryotheca Silesiaca* (Exsiccati of Silesian Mosses). Fasc. I-VII, Nos. 1-350. Bunzlau and Breslau, 1866-1871.
2. *Schlesien's Laub-und Lebermoose, nebst Nachträgen.* (Mosses and Liverworts of Silesia, with Supplement.) In F. Cohn: *Kryptogamen-Flora*. Bd. I, pp. 27-352, and pp. 413-444. Breslau, 1877. (358 pages).
3. *Laubmoose Deutschland's, Oesterreich's und der Schweiz.* Bd. IV. von Rabenhorst's *Kryptogamen-Flora*, 2 Aufl., 1890-1902.

It is this latter work especially, its quality of scientific poise as well as its contents, that has placed American as well as all other bryologists under a debt of obligation to the author, and that makes us all wish to know more about him. Besides these, his principal works, the following are his briefer papers:

1. *Beitrag zur Bryologischen Kenntniss der Grossen Schneeegrube und der Kesselkoppe*, in "Jahresberichte der Schlesischen Gesellschaft für vaterländische Cultur," 44th year, pp. 139-146, Breslau, 1867.
2. *Ueber das Vorkommen der Lebermoose im Schlesisch-mährischen Gesenke*, in l. c., 49th year, pp. 75-81. Breslau, 1872.
3. *Ueber die Moosflora der Oberschlesischen Muschelkalkhügel*, in l. c. 50th year, pp. 96-97, 1873.
4. *Nachtrage zu J. Milde's Bryologia Silesiaca*, in l. c., 50th year, pp. 124-140, 1873.
5. *Ueber die Moosvegetation der Babiagora*, in l. c., 51st year, pp. 77-78, 1874.
6. *Ueber die Laubmoose der Hohen Tatra*, in l. c., 52d year, pp. 92-94, 1875.
7. *Novitäten aus der Laubmoos-Flora der Hohen Tatra*, in l. c., 52d year, pp. 130-132, 1875.
8. *Die Lebermoose der Hohen Tatra*, in l. c., 54th year, pp. 143-152, 1877.
9. *Ueber die Moosflora der Insel Bornholm*, in l. c., 57th year, pp. 272-273, 1880.
10. *Neue und Kritische Lebermoose*, in l. c., 57th year pp. 311-317, 1880.
11. *Neue Buerger der Schlesischen Moosflora*, in l. c., 57th year, p. 310, 1880.
12. *Ueber Neue Arten und Formen der Gattung Sarcoscyphus Corda*, in l. c., 58th year, pp. 179-184, 1881.
13. *Ueber Neue Muscineen fuer Schlesien*, in l. c., 58th year, pp. 184-186, 1881.
14. *Einige Neue Funde aus der Schlesischen Moosflora*, in l. c., 59th year, pp. 278-9, 1882.
15. *Ueber Sphagnum, Myurella und Fontinalis*, in l. c., 59th year, p. 317, 1882.
16. *Einige Neue Laubmoose*, in l. c., 60th year, p. 214, 1883.
17. *Neue Buerger der Schlesischen Moosflora*, in l. c., 60th year, pp. 242-3, 1883.
18. *Moose aus Norwegen*, in l. c., 61st year, p. 175, 1884.
19. *Die Moose im Sorbusguertel des Riesengebirges*, in l. c., 61st year, p. 24, 1884.

20. *Ueber Einige Neue Arten und Formen bei den Laub- und Lebermoosen*, in l. c., 61st year, pp. 204-225, 1884.
21. *Ueber Tuepfelbildung bei Laubmoosen*, in l. c., 62d year, p. 289, 1885.
22. *Ueber Porenbildung in der Stengelrinde von Sphagnum*, in l. c., 63d year, p. 199, 1886.
23. *Ueber Neue Buerger der Schlesischen Moosflora*, in l. c., 63d year, p. 214-5, 1886.
24. *Ueber Th. Guembel, Beitræge zur Entwicklungsgeschichte der Laubmoose*, in l. c., 65th year, p. 258, 1888.
25. *Ueber Neue Laubmoose*, in l. c., 68th year, p. 93, 1891.
26. *Drei Neue Laubmoose*, in l. c., 47th year, 5 pages, 1897.
27. *Zur Systematik der Torfmoose*. in "Botanisches Centralblatt, von Uhlworm." Cassel: First paper, Bd. VII, No. 36, pp. 411-319, 1881; Second paper, Bd. X, No. 6, 1882.
28. *Besprechung von W. Ph. Schimper's Synopsis Muscorum Europæorum*, in "Flora oder Regensburger Botanische Zeitung," 9 pages, 1876.
29. *Die Deutschen Sauteria Formen*, in l. c., No. 6, 4 pages, 1880.
30. *Ueber Gymnomitrium adustum, N. v. E.*, in l. c., No. 5, 7 pages, 1881.
31. *Ueber Eine Verschollene Jungermannia*, in l. c., No. 3, 4 pages, 1882.
32. *Neue Kritische Laubmoose*, in l. c., No. 13, 5 pages, 1882.
33. *Nekrolog auf Professor J. Milde*, in "Hedwigia von L. Rabenhorst," Dresden, bei Heinrich, No. 10, 4 pages, 1871.
34. *Ueber Leptotrichum sonatum*, in l. c., No. 12, 2 pages, 1872.
35. *Schlesische Lebermoose*, in l. c., No. 2, 3 pages, 1876.
36. *Auf der Schlesisch-maerkischen Grenze. Ein Bryologischer Beitrag*, in "Verhandlungen des Botanischen Verein's der Provinz Brandenburg," Bd. IX, No. 108-116, 1967.
37. *Reviews of the entire Moss Literature in the years 1875-8*, in "L. Just, Botanischer Jahresbericht," Berlin, bei Bornträger, Bd. VI, 1876-1881.
38. *Ueber Laub- und Lebermoose* in "den Berichten der Deutscher Botanischen Gesellschaft," Bd. III, Heft II, 1881. (Also a review).

These constitute the numerous bryological writings of Limpricht. He explored personally the Mossflora of Silesia (Riesengebirge), of the Karpathen (Tatra), and the Islands of Bornholm. It is strange that the *Revue Bryologique* failed to give a hint as to the richness of this author's productivity, which led me to suppose that he published little, concentrating all his energies in his *Laubmoose*. It is true, however, that most, if not all of his productions antedate his labor on his monumental work.

Winona, Dec. 15th, 1902.

THE MOSSES OF ALASKA.

BY J. CARDOT AND I. THERIOT.

This is No. XXIX. of the "Papers from the Harriman Alaska Expedition." It is published in the "Proceedings of the Washington Academy of

Science," Vol. IV., pp. 294-374, July 31st, 1902. The eleven plates illustrating the new species are executed by M. Theriot, in this author's excellent and painstaking style and show microscopic details with accuracy. The list of 280 species of Alaskan mosses enumerated here includes, besides the Harriman collection, previous collections as follows: that of W. H. Dall, in 1867; of the Krause brothers, in 1882; of W. G. Wright, in 1891; of James M. Macoun, 1891-2; of B. W. Evermann, in 1892; of C. H. Townsend, in 1893-1895 (Expedition of the U. S. S. *Albatross*); of W. M. Canby, in 1897; of W. H. Evans, in 1897; of W. A. Setchell, in 1899; and of F. C. Schrader, in 1899. Of these, 124 are new to Alaska, and 46 are new to science. Of the latter 29 are new species, and 17, new varieties.

The new species and varieties will be described in successive numbers of THE BRYOLOGIST as space permits. Three new combinations are made. First, *Trichostomum affine* Schleich., which in Bryol. Eur. stands as a synonym for *Racomitrium heterostichum alopecurum* B. S., is written *Racomitrium heterostichum affine* (Schleich) C. & Th. Then, *Atrichum Lescurii* James, which Mr. E. S. Salmon had placed under *Lyellia*, the authors place under *Bartramiopsis Lescurii* (James) C. & Th. not Kindb. Also *Pogonatum Macounii* Kindb., becomes *Pogonatum alpinum Macounii* C. & Th.

A number of species are accompanied by critical notes recording the authors' judgment. Thus *Mnium nudum* Williams, for reasons stated, is considered rather a subspecies of *Mnium punctatum*. *Psilopilum Tschutschicum*, discussed under *P. arcticum* Brid., is discredited as a good species. On this point there appears to the writer ground for difference of judgment. (See THE BRYOLOGIST, September, 1902.) Incidentally it may also be noted that the authors have preferred to retain the name *Psilopilum arcticum* in place of the revised name. *Polytrichum Yukonense* C. & Th. is under suspicion of being only a form of *P. Jensenii* Hagen, most of the differentiating characters given being variable in the typical *P. Jensenii*. *Pseudoleskea stenophylla* Ren. & Card., for which Dr. Best in his Revision of this genus had substituted *P. rigescens* (Wils.) Lindb., is restored, Dr. Best's substitution being shown as untenable. Likewise *Brachythecium Novæ-Angliæ* Jaeg. & Sauerb. is restored, the character on which it was recently erected into the new genus *Bryhnia*, the *papillose leaves*, having proved to be variable.

There is a short postscript of three notes. The first of these refers to Mr. R. S. Williams' Catalogue of the Bryophytes of the Yukon, which was published in 1901 in the Bulletin of the New York Botanical Garden and which contains 115 species not listed in the present paper. This brings the number of species of mosses now known from Alaska and the Bering Sea Islands up to about 350, not considering a large number of doubtful species mentioned in passing by the authors.

JOHN M. HOLZINGER.

SOME NOTES ON COLLECTING.

Within the past three years I have discovered the haunts of several of the minute species of mosses on my collecting trips, such as *Archidium Ohioense*, *Phascum* sp., *Pleuridium subulatum*, *Astomum* sp., *Ephemerum crassinervium*, *Physcomitrium immersum*, *Pyramidula tetragona*, and *Bruchia flexuosa*.

Six of these beautiful little plant species I found in the close vicinity of Winona, where I had collected for over fifteen years. This fact, linked with the other fact that these and similar minute mosses are in late years very little represented in collections, leads me to suspect that our younger generation of moss students, including myself, have yet to learn *where* and *when* to look for them. Having by chance stumbled upon the hiding places of these little elves, not merely sporadic patches but the regular haunts, it has occurred to me that it might be profitable for the more enthusiastic collectors of the Sullivant Chapter, and for all interested, to learn where and when I found these mosses.

The *Ephemerum* and *Physcomitrium* I found associated together several years ago on the shaded edge of a Mississippi slough, where weeds and grass do not come up to furnish excess of shade. The months are October and November. Since then I have annually looked for them on my November tramps through the river bottoms and most always I bring home some *Ephemerum* and its protonema. The *Physcomitrium* is more freaky, and is not easily found, apparently depending for its best development upon more exact seasonal conditions.

The *Archidium*, *Phascum*, *Pleuridium* and *Astomum*, I found first two years ago on the top of our bluffs 450 feet above the level of the Mississippi bottoms, on slightly north-facing surfaces, which during early summer become covered with a scant growth of grass, but which the dry autumn leaves again practically bare for the winter snows. The outcrop of Magnesian limestone weathered to fragments near the tops of the bluffs are there mantled over by a thin sheet of modified drift clay, or possibly it is simply wind-blown clay, which I doubt, blackened with the mould of the scant vegetation. It is in this situation that these little mosses have their home, starting their annual life effort *under the melting snows*. By a mere chance I stumbled upon them where I never thought it possible for anything worth looking for to exist, on one of my late March bluff rambles, when the roads were still muddy from snow-water. Repeated visits (for I am less than a mile from the spot at this writing, January) showed that the fruits ripen rapidly; and after the middle of April they soon show signs of weathering, and shortly seem to disappear altogether, the ground receiving now too much heat for their existence. Indeed the drouth has the past two seasons come on so rapidly that in case of *Astomum* only a few of the abundantly set capsules actually ripened spores.

The *Pyramidula* I found in June, 1901, in the upper Mississippi valley, in scant soil, probably windblown, in the shallow depressions of the water-worn granitic outcrops of that interesting region. It was very abundant

there, though I found only weathered plants. I regret that the distance, nearly the width of our State, makes it difficult to visit that profitable collecting ground often.

Lastly, the *Bruchia* I found only in June, 1902, close to the railway station at Dodge, Wis., some miles north of Winona, in the Trempealeau River valley. The plants occurred in greatest abundance among the short juncus and similar grass-like plants in a patch of fallow ground close by a tamarack swamp. In this case also all were already badly weathered. It is my purpose to revisit that station five or six weeks earlier this spring to secure plants in better condition.

In closing this note it may be worth mentioning incidentally that the geographical range of several of the species noted has been considerably extended.

JOHN M. HOLZINGER.

NOTES.

POGONATUM BREVICAULE (Brid.) Beauv.

In a recent letter M. Jules Cardot calls attention to the fact that Bridel in 1798 first gave the name *Polytrichum brevicaule* (Muscol. Recent II. pt. 1, p. 87) to the moss which has since been called *Pogonatum brevicaule* and that the specific name *tenue* was given to the same plant in the same year by Menzies, hence it is next to impossible to say which has the priority.

This being the case I agree with M. Cardot that *P. brevicaule* (Brid.) Beauv. is the proper name for this plant, because this name was in use for eighty-nine years before Mrs. Britton made the new combination.

A. J. GROUT.

PSILOPILUM TSCHUCTSCHICUM C. Müll.

In recently looking over a collection of mosses received at the Botanical garden from Prof. Macoun, which he made in the upper Yukon region last summer, I found good fruiting specimens of what I take to be the above species. They are undoubtedly the same as the sterile plants I collected on the Klondike river in 1899 and referred to *P. arcticum*. They are distinguished from this latter by the much longer, less curved capsules, less imbricated leaves, incurved when dry and by the margins of the leaf and also of the lamellæ, which are entire or only slightly undulate above, while *P. arcticum* has both leaf border above and lamellæ on margin irregularly serrate with crowded, crenulate teeth. In the first specimens I examined this last difference was scarcely noticeable owing to the much abraded margins. The distinction of basal leaf cells between the two species is not apparent, being quite variable in different leaves from the same plant. (See J. M. Holzinger's article on these species in *BRYOLOGIST* V:80, 1902). Also the difference in the exothecal cells does not seem to have been clearly pointed out. In *arcticum* the cells on the incurved side of the capsule are short, often slightly transversely elongated, while on the opposite side they are quite rectangular and mostly 2 to 3 times longer than wide. In *Tschuctschicum* the cells are more uniform around the capsule, mostly from a little longer than broad to about twice longer. The spores of the Macoun specimens measure from .022 to .025 mm.

R. S. WILLIAMS, N. Y. Botanical Garden.

MNIUM INSIGNE Mitt.

Among some mosses which I recently received from the Vienna Exchange Club for Cryptograms, was one labelled *Mnium insigne*, Mitt. June 20, 1896; on wet shaded earth, Columbia Falls, Montana, U. S. A. R. S. Williams. I examined this moss which had abundant capsules with interest, as *M. insigne* is generally considered synonymous with *M. Seligeri*, Jur., which is a shy fruiter in Europe and very rare in England in that condition. I was, however, surprised to find that the fruiting plants had a clearly synoicous inflorescence, though a few purely ♂ flowers were also present. I also found that the leaves were rather broadly ovate and sharply pointed which together with their long sharp marginal teeth, generally consisting of but one cell, and ceasing about the middle of the leaf, suggested that the plant before me was scarcely the same as the European *M. Seligeri*. The moss in question seems to agree well with the diagnosis given by Limpricht of *M. Drummondii* Br. & Sch. of which unfortunately I have no authentic specimens, but I cannot find that *Mnium insigne*, Mitt. is given as a synonym for this species, although Limpricht points out that Mitten's species is not the same as *M. Seligeri* Jur., to which many authors have referred it. A close comparison of the European and American species of this fine genus would be of great interest.

January, 1903.

W. E. NICHOLSON,
Lewes, Sussex, England.

SULLIVANT MOSS CHAPTER NOTES.

Dr. Best says of *Claopodium pellucinerve* (Mitt) Best, offered in this number of THE BRYOLOGIST by Mrs. J. B. Lowe, and collected by her at Noroton, Ct.: "So far as I know it has been collected only once before this and then by Mr. R. S. Williams in the Yukon territory. See THE BRYOLOGIST 3:19, 1900."

HARRIET WHEELER.

Members desiring the offerings will please forward stamped and addressed envelopes to the donors. H. W.

Confusion would be avoided and some labor saved if the annual dues of Chapter members were paid directly to the Secretary who reports such payments to the editors of THE BRYOLOGIST and members receive the magazine to which they are thereby entitled. Subscriptions to THE BRYOLOGIST should be paid to Mrs. Annie Morrill Smith. H. W.

In a letter just received from Prof. Holzinger he says: "If you have space please express my cordial thanks to the Sullivant Moss Chapter for honoring me with the Presidency. I promise to be faithful to this high trust and work hard." He adds in a letter of a few days later date: "Members wishing mosses determined *must* prepare material neatly, and send *abundant* specimens, in *proper, folded envelopes* with exact data written thereon. Scraps of mosses put up in indifferently folded scraps of paper will receive no consideration. Use pockets of good paper 7 x 8 inches. This request is absolutely necessary since the endless scraps have come pouring in."

Prof. Holzinger is right. The former Secretary of the Sullivant Moss Chapter felt her work to be largely of an educational nature, and for fear of nipping a bud prematurely, took extra pains with "scraps" and often consumed hours of time in their determination only to find the collector had no more material, so all that labor was wasted. Why? Because, if that little scrap contained a peculiar form—albeit of a well known species, it has only too frequently happened that a new variety or species even has been described, only later to have it find its true place as one in a long link of intermediate forms in a well known series.

The moral is: send good sized specimens for determination with proper data. A. M. S.

REPORT OF THE LICHEN DEPARTMENT,

A year ago the Lichen Herbarium belonging to the Moss Chapter was placed in my hands. At that time it contained fifty specimens, representing eighteen genera and forty-four species. At the present time there are one hundred and seventy specimens, representing twenty-seven genera and ninety-five species and varieties. Many of the specimens have been contributed by the members of the Moss Chapter, and I hope during the coming year there will be many more contributions to the Chapter Herbarium.

I would urge all who are interested in the Lichens to make local collections, taking pains to collect good sized specimens and in fruit where it is possible. The Lichens should be pressed lightly while damp, if allowed to dry without pressing they are much more brittle. It would be well if more of the members would offer specimens for distribution, in this way they will gain experience and secure specimens from other localities which will be useful for comparison.

A number of specimens from California, Montana, Oregon and Lower California have been added during the past year.

The many letters asking for help in determining lichens and the requests for the offerings prove that the interest is growing in the study of these plants.

Respectfully submitted, CAROLYN W. HARRIS.

OFFERINGS TO CHAPTER MEMBERS.

[To chapter members only—for postage.]

Miss Mary F. Miller, 1109 M Street, N. W., Washington, D. C. *Rhyncostegium rusciforme*, *Dicranum undulatum*, *Funaria hygrometrica*, *Bryum proliferum*, *Aphanorhegma serratum*, *Hypnum Haldanianum*.

Mrs. J. D. Lowe, 200 "A" Street, S. E., Washington, D. C. *Brachythecium plumosum*, *Amblystegium riparium longifolium*, *Claopodium pellucidum*, *Sematophyllum adnatum*.

Mr. J. Warren Huntington, Amesbury, Mass. *Philonotis fontana*, *Leptotrichum glaucescens*, *Barbula tortuosa*.

Prof. J. M. Holzinger, Winona, Minn. *Pyramidula tetragona*, *Grimmia leucophea*, *Grimmia Pennsylvanica*, a limited supply.

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JULY, 1903



THE BRYOLOGIST

AN ILLUSTRATED BIMONTHLY DEVOTED TO


NORTH AMERICAN MOSSES

HEPATICS AND LICHENS

EDITORS:

ABEL JOEL GROUT and ANNIE MORRILL SMITH

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BIMONTHLY JOURNAL DEVOTED TO THE STUDY OF NORTH AMERICAN MOSSES
HEPATICS AND LICHENS.

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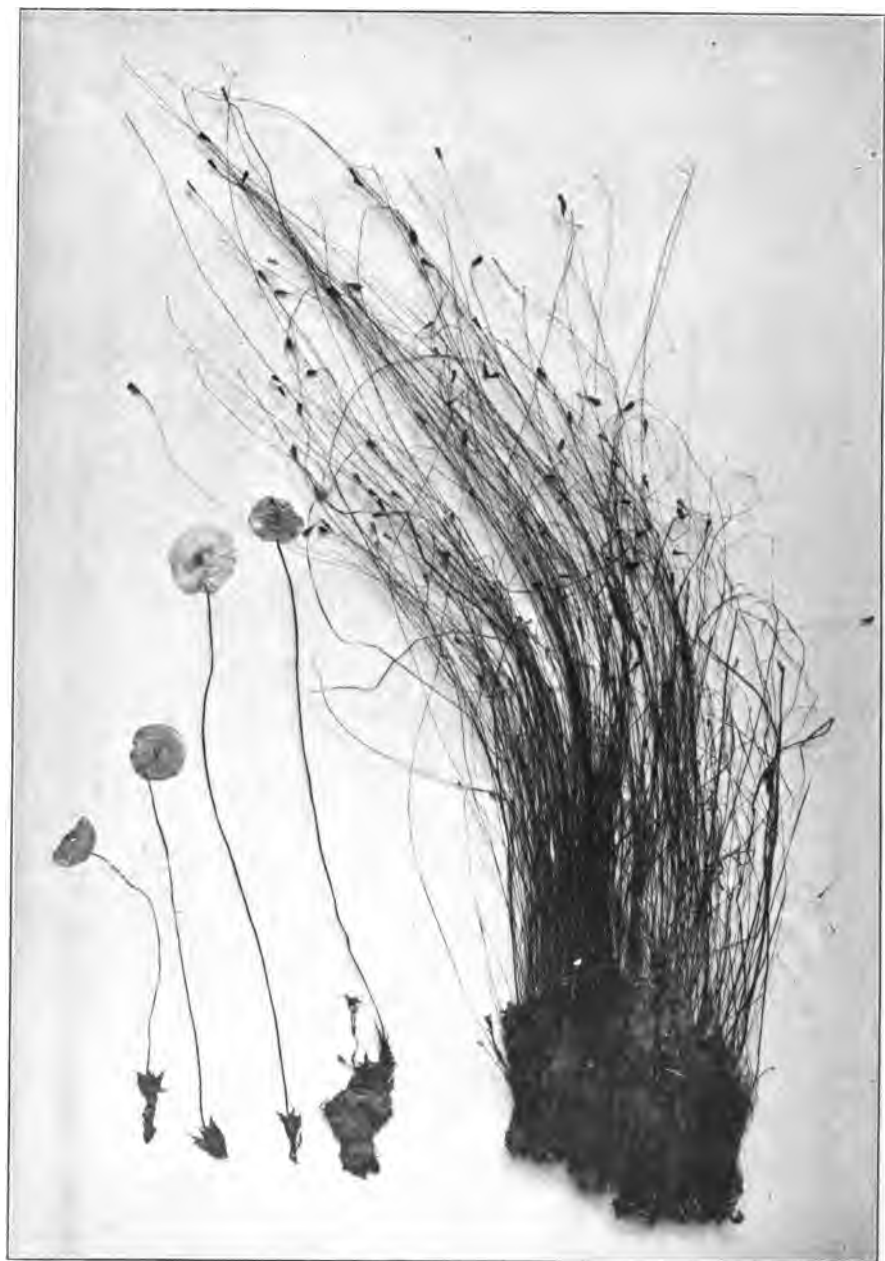


PLATE XI. *Splachnum luteum*.

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NOVEMBER, 1903.

No. 6.

THE SPLACHNUMS.

ELIZABETH G. BRITTON.

The taller specimens of *Splachnum luteum*, illustrated in the plate accompanying this number, were collected by Mr. M. W. Gorman at White River, Yukon Territory, near the Alaska Boundary. The specimens are remarkable not only for their large size, which exceeds any measurements recorded, but also for the fact that very few of the capsules had developed the characteristic apophysis or "yellow umbrellas" which are shown in the smaller specimens. But it was these "umbrellas" that attracted Mr. Gorman's attention, for he says, "I noticed a moss in open spots on the borders of Sphagnum marshes, that I had not observed in Oregon, Washington or southern Alaska. The tall delicate stems had many of their tips surrounded by a pale yellow cap about five-sixteenths inches wide, causing the moss to be noticeable amongst the surrounding grasses, sedges and ericaceous plants. I would like an explanation of the yellow caps, some of which may still be seen on the specimen, although it has been twice immersed in the icy waters of the White River."

Their absence may be due to immersion in cold water, but it is evident that although they were collected on August 14th, they had not fully developed and grew taller from being among shrubs and grasses. It generally happens with most mosses that grow in crowded tufts, that some of the plants do not get their share of nourishment and room, and hence do not attain the size and development that others do. This may be seen in *Funaria hygrometrica* particularly. In endeavoring to learn something about the anomalous specimens of *Splachnum*, the researches made by J. R. Vaizey on this species, published in the Annals of Botany for 1890, will be of interest. In this paper he states that being convinced of the importance of obtaining further knowledge of the highest development to which the sporophyte of the mosses attains, as being likely to throw light indirectly on the phylogeny of the higher Cryptogams and Phanerogams, he determined to investigate the morphology of *Splachnum luteum* and *S. rubrum*. These species being arctic or subarctic, and not found in Great Britain, he made a journey to Norway for his material. He did not succeed in getting much of the Red Umbrella Moss, but of the yellow he secured abundant specimens. He says of these:

"In the sporophyte of *S. luteum* we have a structure with a remarkable similarity to an umbrella, the handle end, which is inserted in the tissues of the oophyte, is known as the foot. The seta is much elongated, frequently attaining the length of 150 meters (6 inches); it bears the umbrella-like expansion, the apophysis, at the top just below the sporangium. It is the structure of the apophysis which is of greatest interest." Mr. Vaizey found

The September BRYOLOGIST was issued September 1st, 1903.

that the tissues of the oophyte surrounding the foot, contained a quantity of organic substance, and that large numbers of leucoplastids were developed which served to absorb nourishment for the sporophyte. Sections through the foot, seta and capsule, showed that the water and organic substances were conveyed through the central tissue of the seta to the apophysis. These cells contain little or no chlorophyll, but outside of them in the expanded portions of the apophysis the cells are rich in chlorophyll, and on the upper side of the "umbrellas" have even formed a "palisade-tissue" similar to that developed in leaves of vascular plants. Furthermore there are a number of stomata developed on the upper surface around the top of the umbrella. It is evident then that the apophysis or umbrella, performs the functions of a leaf, and is therefore analogous to the leaves of vascular plants. That is, it is an organ of respiration and assimilation and large quantities of starch are formed in it, especially while the apophysis is still young and green at the beginning of the formation of the umbrella and before the spores ripen.

Unfortunately Mr. Vaizey died before his studies were completed so that gaps remain in the life-history of this most highly developed and specialized moss, but it is evident that even without developing the umbrella the capsules are able to mature their spores. The article is illustrated by a series of plates which are most interesting.

The history of the *Splachnums* is equally interesting. The first reference to them occurs in a small vellum-covered volume, published in London in 1695, called "Petiver's Museum, containing the first century of Rare Natural Objects of Animals, Fossils and Plants." He described *Splachnum rubrum* as "*Muscus Norvegicus umbraculo ruberrimo insignito*. We owe the discovery of this elegant plant to my friend Mr. Richard Wheeler, who gathered it near Portsground, in Norway, and for its singularity and likeness I think it may not very improperly be called his Norway Bongrace Moss. This quaint little volume is filled with pictures of various curious natural objects sent to Pettiver for his museum. Both Ray and Dillenius had descriptions and plates of *S. rubrum*, specimens of which had also been sent from the Lena River. But Linnaeus was the first to give them the names which they now bear. In a series of essays written by his pupils in 1752, one is devoted entirely to three species of *Splachnum*, *S. luteum*, *S. rubrum* and *S. ampullaceum*. *S. luteum* was called the "Swedish Parasol Moss." Linnæus took up the names in his *Species Plantarum*. The apophysis in *S. rubrum* is the same shape and size as in *S. luteum*, but in *S. ampullaceum* it is shaped like an urn, and is much larger than the spore-case.

None of the species of this family are common in North America. *Splachnum luteum* has been collected in New Brunswick by Fowler, and *S. rubrum* was collected on the shores of a small pond in the Adirondacks by Prof. Peck. One curious peculiarity of them all is that they grow on the excrement of animals, on cow and horse dung, and on the decomposing skeletons of animals, such as mice, hedgehogs, etc. *Tetraplodon mnioides* has

been found on the summits of Mt. Marcy, Mt. Mansfield and on Mt. Washington, along the bridle-path, and on the timbers of the stable. There is one species only, which is found in the Southern States. In Europe they used to be common in Alpine pastures, but are growing rare, owing to the drying up and draining of the marshes. It is strange that they are able to maintain such a sporadic and scattered existence, when their food-supply is so uncertain and peculiar.

New York Botanical Garden.

ON SOME FOSSIL MOSSES.

BY JOHN M. HOLZINGER.

Fossil mosses are rare. It is, therefore, with pleasure that I report on some from Iowa. In 1897 Prof. T. H. MacBride took from a railroad cut near Oelwein, Iowa, several wads of moss embedded in blue clay at a depth of 32 feet below the surface of the ground, beneath the Kansas Drift. This material was intrusted to Prof. P. C. Myers, at present science teacher in the Winona High School, for the purpose of ascertaining the presence of diatoms in the clay matrix, and it is from Mr. Myers that I have received this material for examination.

So far as I can ascertain, the age of the deposit under which this moss is found is estimated to be between 5,000 and 10,000 years. Small wonder, therefore, that the stems have become rather brittle. However, it is possible, as I have found by careful manipulation, to float out some stems which show the characteristic branching and leaf position of certain Harpidia, notably of *Hypnum fluitans*, and my conclusion after considerable work on this fragmentary moss, the leaf areolation of which is admirably preserved, is that it is certainly one of the Harpidia and comes nearest to *Hypnum fluitans brachydictyon* Ren. The preservation of this moss for so long a period is a matter of surprise. Two causes seemed to have conspired. First, it is a well known fact that peat bogs formed by the annual addition of vegetable matter furnished to the subaqueous stratum, have by this process antiseptic properties imparted to the water tending to preserve certain organic forms, and the aquatic habit of this Harpidium, together with the blue clay surrounding it (the color of blue clay being due to the presence of carbonaceous matter from bogs), point to this antiseptic bog water as a preservative. Secondly, the matrix, the blue clay, seems to have formed an effective mechanical protection, hermetically sealing it under tons of its substance against the access of air. This second element of protection alone could not have effected the preservation, and the first mentioned element, the antiseptic property of carbonaceous mud in bogs, has probably been the principal factor.

In this connection it is proper to call attention to an article in the Botanisches Centralblatt, 1901, Bd. X, Heft 3, on "A Fossil Moss from the Vicinity of Fulda," Germany. (Ueber ein Fossiles Laubmoos aus der Umgebung von Fulda,) by Mr. Adelbert Geheeb. The author, supported by Dr. K. Schliephacke, determined this moss as *Hypnum fluitans fossile*. *Amblystegium*

filicinum had previously been found fossil by the author, also from near Fulda. Mr. Geheeb mentions still another fossil moss which was found in 1869, in the Schussenquelle, near Schussenried, Württemberg, by Apotheker Valet, and determined by Schimper as *Hypnum sarmentosum* Wahlenb., an arctic-alpine moss.

NOTE.—Since writing the above I have asked Dr. G. N. Best to examine the Oelwein moss. To my surprise he found the bulk of what I sent to be *Hypnum revolvens* Sw., coming in between var. *typicum* and *Cossoni*. He also found bits of a Calliergon which appears to be *H. Richardsoni*. This difference in conclusions led me to float out a larger quantity of the moss, submitting a second lot of twelve packets to Dr. Best, with the result that he agreed with my first determination of that material. I had doubtless overlooked the presence of *Hypnum revolvens*, and the Calliergon, bits of both of which species are scattered through the mass of *H. fluitans*.

Prof. Myers also entrusted to me a very small bit fossil moss, taken eighteen feet under ground, also from under Kansas Drift, from the excavation under the Iowa City High School. This Dr. Best finds to be nearest to *Hypnum fluitans glaciale* Ren.

It thus appears that Iowa has furnished at least four fossil mosses. The material from Oelwein is mostly *Hypnum fluitans brachydictyon* Ren., with a little *Hypnum revolvens* Sw., and *Hypnum Richardsoni*; the Iowa City moss is *Hypnum fluitans glaciale*,
Winona, Minn.

SOME MOSS SOCIETIES.

BY A. J. GROUT.

By the above title I do not mean to designate any generalizations in the phytogeography of mosses, but merely to record a few observations on species associated together in different groupings under different conditions.

I was led to take up this topic by poor health, which prevented my walking more than two or three miles daily. To entertain myself I selected the various places mentioned in this account, and set myself to find all the mosses growing in each spot under conditions as nearly similar as possible. For instance, when collecting on the stone wall I carefully avoided plants growing on the soil at the base of the wall. I have been greatly surprised by the results, as I have collected several species for the first time, in localities that have been familiar to me for years, and I have discovered a great extension of range in at least one case (*Fabroleskea*).

I have also found several plants on unusual substrata, e. g., *Grimmia apocarpa* and *Hedwigia* on the old roof, and *Ulota crispa* on the stone wall. In this last case Dr. Best suggests that scraps of bark, etc., from the trees overhead furnished the material suitable for the first stages in the development of the plants.

Perhaps the most interesting collecting place was the cut in Brooklyn Heights, where the Wall St. Ferry cars pass up along Montague St., from the water level to the level of the Heights. The ground here is apparently springy, and in the chinks between the stones I found five or six species, the

first two in fruit: *Funaria hygrometrica*, *Leptobryum pyriforme*, *Bryum caespitium*, and another *Bryum* which may be a variety of this but is probably a different species, *Barbula unguiculata*, and *Amblystegium Kochii*, B. & S. The first two of this list with *Ceratodon* I had previously collected on the brick foundations of my Brooklyn (Flatbush) house. The last was one of the greatest surprises of the season.

In May of this season I collected *Bruchia Sullivantii* Aust., for the first time. It grew in a sandy field in Lawrence, L. I., just beyond the city limits. I was interested to note the other plants growing associated with it so as to know where to look for more. Growing with it, or near it under similar conditions were *Pleuridium subulatum* (L.) Rabenh., *Weisia viridula*, (L.) Hedw., *Ceratodon purpureus*, *Ditrichum pallidum*, *Catharinaea angustata*, *Bryum caespitium*, *Polytrichum commune*, and *Mnium sylvaticum*. Some of these evidently thrive during the wet weather of early spring and others during the dry weather. The soil was sandy with a little clay, recently (within a year or two) plowed. The daisy, *Antennaria* sp., and the creeping blackberry were accompanying flowering plants.

An old pear tree in my father's yard, from which I have eaten fruit for thirty years, yielded *Pylaisia Schimperii* R. & C. (*P. intricata*), *Orthotrichum strangulatum* Sulliv., *O. speciosum*, Nees., *O. Ohioense*, S. & L., *O. obtusifolium*, Schrad., *O. sordidum*, S. & L., *Fabroleskea Austinii* (Sulliv.) Best (Det. Dr. Best), *Ulota (Weissia) crispa*, *U. coarctata*, *Amblystegium adnatum* on the bark of the tree from 3-7 feet from the ground. In a knot hole grew *Brachythecium salebrosum*, and at the base of the tree *Amblystegium serpens*. Besides the mosses there was a minute hepatic in the bark growing mosses.

From an old roof in the village of Williamsville in the same town, I collected *Ulota (Weissia) crispa*, *Grimmia apocarpa*, *Hedwigia albicans*, *Platygyrium (Entodon) repens* with flagella; *Ceratodon purpureus*, *Brachythecium oxycladon* and also a form with secund leaves, *Hypnum reptile*, *H. Haldanianum*, *H. fertile*, and *H. Schreberi*. I find *Dicranum Bonjeani* De Not., to be frequently on old roofs; indeed it is the only place I have ever found the typical form, but I have never found it fruiting. It did not occur on the roof from which the above named collection was taken.

On an old log, in deep moist woods, at an altitude of 1300 ft. I found *Georgia pellucida*, *Dicranum scoparium*, *D. viride*, *D. flagellare*, *Mnium ciliare*, *Thuidium recognitum*, *Hylocomium proliferum*, *H. Pyrenaicum*, *Hypnum Haldanianum*, *H. hispidulum*, *H. reptile*, *H. Schreberi*, and an undeterminable species of *Hypnum*, *Plagiothecium denticulatum*, *P. turfaceum*, *Raphidostegium recurvans*, *Brachythecium oxycladon*, *Cephalozia* sp., and two other hepatics.

On about four rods of old stone wall under two great maples, and on the north side of the wall, I found *Dicranum longifolium*, *Dicranum* sp., *Ceratodon purpureus*, *Grimmia apocarpa*, *Hedwigia*, *Ulota Americana*, *U. crispa* forma, *Bryum caespitium*, *Mnium sylvaticum*, *Amblystegium adnatum*, *Hypnum reptile*, *Plagiothecium denticulatum*, *Platygyrium*

repens with flagella, *Brachythecium populeum*, *B. velutinum*, *Porella platyphylla* (L.) Lindb., *Radula complanata* (L.) Dum., *Cephalozia* sp.

All of the studies except the first two were made in the town of Newfane, Vermont. The names are the same as those in my Vermont Mosses unless the authorities are given.

BUXBAUMIA APHYLLA L.

In the September BRYOLOGIST Mr. Chamberlain mentions the finding of *Buxbaumia aphylla* on the Maryland bank of the Potomac, near Washington, D. C. I also have this species from the vicinity of Washington. Among a lot of fresh mosses collected for me by a young friend, on December 1st, 1900, were seven or eight plants of *Buxbaumia aphylla*, with capsules not quite mature. They had been found on the ground, in woods near Capitol View, Md.—about ten miles north of the city.

MARY F. MILLER,
Washington, D. C.

DR. BEST'S REVISION OF LESKEA.

In the Bulletin of the Torrey Botanical Club for September, 1903, Dr. G. N. Best publishes a "Revision of the North American Species of Leskea," which is a notable contribution to the literature of North American bryology. Dr. Best makes two new species and two new varieties. He also publishes two other varieties not new but with new names. These descriptions we give below in full.

Dr. Best describes two other species not included in the Manual of Lesq. and James, *L. gracilescens* Hedw. and *L. tectorum* (A. Braun) Lindb. We print also his notes on these two species but not his descriptions. As a help to the understanding of the relationship between the new and old species we publish Dr. Best's Key. The text is accompanied by two excellent plates drawn by Miss Alexandrina Taylor.

It is a pleasure to see a work like Dr. Best's; it is conservative, but not too much so. New species are not founded on mere scraps, à la Kindberg (and some other European writers that might be mentioned), but are founded on plants representative of a large series of widely distributed forms. In nomenclature he recognizes the claims of usage, and also that names are made for science and not science for names.

If Dr. Best were to accept the principles lately laid down and followed by our foremost fern students it would not be Leskea at all. Heaven only knows what it might be, but Dr. Best says "The usually accepted type of Leskea is *L. polycarpa*, and since both the name and the type bear the sanction of all recent authorities, the author of the Revision feels constrained likewise to accept them."

A. J. GROUT.

Reprinted and abridged from the Bulletin of the Torrey Botanical Club, 30, Sept., 1903.

REVISION OF THE NORTH AMERICAN SPECIES OF LESKEA.

By DR. G. N. BEST.

Key to the Species.

EULESKEA: leaves papillose, costate; median cells usually isodiametric; peristomial teeth abruptly incurved from a bulging base when dry.

Leaves ovate-lanceolate, acute to acuminate, more than twice as long as wide.

Leaves more or less secund; leaf-cells distinct.

Capsules straight; operculum short-conic

L. polycarpa.

Capsules curved; operculum long-conic.

L. arenicola.

Leaves straight; leaf-cells small, indistinct; capsules straight, erect.

L. microcarpa.

Leaves ovate, subacute to obtuse, less than twice as long as wide.

Leaves symmetric, biplicate, margins often revolute.

L. gracilescens.

Leaves asymmetric, not plicate, margins plane.

L. obscura.

HETEROLESKEA: leaves smooth or nearly so, costate or ecostate, median cells longer than wide; peristomial teeth erect when dry.

Leaves denticulate, ecostate.

L. denticulata.

Leaves entire or nearly so, costate;

Acumen longer than body;

Costa subpercurrent.

L. nervosa.

Costa short.

L. Williamsi.

Acumen shorter than body;

Costa short, bifid.

Leaves smooth.

L. tectorum.

Leaves subpapillose.

L. cyrtophylla.

(1) *Leskea polycarpa subobtusifolia* (C. M. & K.) Best.

Leskea subobtusifolia C. M. & K.; Macoun, Cat. Can. Pl. 6:169. 1892.

Subsp. *L. obtusifolia* Kindb. Eur. & N. Am. Bry. 25. 1896.

Tufts dirty yellowish green; stems and branches curved at tips; stem-leaves subsecund, biplicate, ovate-oblong to ovate-lanceolate, subacute to obtuse, obliquely pointed, the lower acuminate and blunt-pointed, 1 mm. long, 0.4 mm. wide; leaf-cells as in *L. polycarpa*. Macoun, Canadian Musci 533.

Professor Macoun has kindly loaned me the duplicate of the type, collected at Sprout, Pass River, B. C., as well as other material from the same locality and referred to it. All the specimens are destitute of fruit and are unquestionably but forms of *L. polycarpa*, nearer however the var. *paludosa* than the type. It is retained as a variety from the fact that the sporophyte when found might possibly offer something distinctive entitling it to specific rank.

(2) *Leskea arenicola* Best.

Plants somewhat rigid, in loosely spreading tufts, pale yellowish green passing to reddish brown; stems 2-5 cm. long, creeping, radiculose, pinately branched; branches simple, ascending, sometimes curved; central strand small, distinct; paraphyllia multiform, mostly linear-lanceolate; stem-leaves rigid, secund, 0.4-0.5 mm. wide, 0.8-1 mm. long, ovate to ovate-lanceolate, obliquely acuminate, acute to blunt-pointed, scarcely biplicate, margins usually recurved at base, entire or sinuate-serrulate above, costa disappearing in the acumen; leaf-cells somewhat clear, stoutly uni-papillate on under

surface, usually smooth on upper alar; cells quadrate, in 5 or 6 rows; median oval-rhombic to oblong-fusiform, 8-9 μ wide, about twice as long; branch-leaves broadly lanceolate, scarcely secund, 0.25-0.35 mm. wide, 0.5-0.7 mm. long; monoicous; perichetial bracts appressed, plicate, costate, long and narrowly acuminate, entire or serrulate above; pedicel 1.5 cm. long, grooved, twisted to the left below, to the right above, curved, reddish; capsule oblong-cylindric, curved, tapering at base, wrinkled when dry; urn about 2 mm. long, 0.6 mm. wide; exothelial cells oblong-linear, thick-walled; annulus broad, 2-3 rows of cells; teeth lanceolate-linear, 0.6-0.7 mm. long, 0.03 mm. wide, yellowish below, pale above, densely papillose, divisural line faint, ventral surface strongly lamellate; endostomial band yellowish, papillose, about one-seventh the length of the teeth; segments as long as the teeth, split, scarcely open on the keel; cilia rudimentary; operculum whitish, subshining, narrowly conic, about one-half as long as the urn; calyptra cucullate; spores smooth, 10-13 μ , mature in early summer. On the base of trees, rarely on decaying wood, in sandy places. (Plate 15, Figs. 1-13.)

TYPE LOCALITY: Delaware; collected by Mr. A. Commons, June 9, 1894; type in the New York Botanical Garden.

DISTRIBUTION: From Maine southward along the coast to Virginia and northward and westward to Minnesota and Dakota. Maine (Merrill); New York (Maxon, Grout); New Jersey (Best); Delaware (Commons); Maryland (Smith, Holzinger); Virginia (Vail and Britton); Ohio (Lesquereux); North Dakota (Holzinger); Minnesota (Holzinger).

EXSICCATAE: S. & L. Musc. Bor. Am. 243 and 365 as *L. obscura*; Ren. & Card. Musc. Am. Sept. 192b as *L. polycarpa forma*.

My first acquaintance with *L. arenicola* was in 1892 while collecting in the New Jersey pine-barrens. Recognizing its distinctness as a species specimens of it were distributed under this name. Subsequently, however, while examining the collection of the New York Botanical Garden, the same species was found under the name of *L. Donnellii*, having been collected in Maryland by Mr. J. Donnell Smith and so named by Austin. The type being in a poor condition, with only fragments of peristomes and no opercula, it was thought best to discard Austin's manuscript name and use a type as well as a new name.

L. arenicola is readily distinguished from all other species of *Euleskea* by its curved capsules, longer teeth and segments, longer and narrower opercula and by its rhombic, elongated leaf-cells. In its general appearance it resembles some forms of *L. polycarpa paludosa*, from which it is however easily separated by the character just named. When once understood it will probably be found more common than here indicated.

(3) ***Leskea nervosa nigrescens*** (Kindb.) Best.

Leskea nigrescens Kindb. Bull. Torrey Club, 16: 97. 1889.

Leskea nervosa var. *flagellifera* Kindb. Ottawa Nat. 4: 62. 1890.

Anomodon heteroides Kindb.; Macoun, Cat. Can. P. 6: 62. 1890; Eur. & N. Am. Bry. 12. 1896.

In intricate tufts or mats, dirty yellowish green to dark green or black; stems 2-3 cm. long, creeping, scarcely radiculose, defoliate or with distant ovate narrowly acuminate recurved leaves, irregularly branched; branches usually few, short, ascending with numerous flagelliform branchlets, commonly bearing bulbils at their tips; branch-leaves as in type but

smaller, 0.2-0.3 mm. wide, 0.4-0.6 mm. long; leaf-cells quadrate-hexagonal smooth or slightly papillose, 6-8 μ wide; leaves of branchlets rudimentary, scarcely costate; sterile. On the base of trees, sometimes on stones and rocks; with the type but less common; Canad. Musc. 395.

In nearly all specimens of this variety leaves, from either stems or branches may be found sufficiently developed to show that they are identical with those of *L. nervosa*, proving conclusively that var. *nigrescens* is only a retrograde form of this species. Moreover tufts are often made up of both plants growing together, the one bearing bulbils in small heads, the other a few on flagellate branchlets. While these organs are usually sessile when in compact clusters, they sometimes appear on short flagellate stems, thus constituting a transitional form between those of the type and those of var. *nigrescens*. Such was conspicuously the case with a specimen from Vermont (Dr. Grout).

(4) ***Leskea Williamsi* Best.**

Plants quite small, in spreading subshining tufts, pale yellow to golden brown; stems slender, creeping, radiculose, pinnately branched, 2-4 cm. long; central strand none; branches ascending, simple or with flagellate branchlets; lower stem-leaves decolorate, roundish ovate, abruptly acuminate, costa short, nearly obsolete; upper stem-leaves appressed when dry, erect spreading when moist, straight or subsecund, entire or serrulate above, ovate lanceolate, acuminate, acumen about as long as the concave biplicate body, 0.25-0.35 mm. wide, 0.4-0.5 mm. long; margins recurved below or plane all around; costa short, thin, simple or bifid, scarcely reaching the middle; branch-leaves smaller, 0.15-0.20 mm wide, 0.25-0.4 mm. long; leaf-cells smooth clear; median linear-rhomboidal to fusiform, subvermicular, about 6 μ wide, 3-5 times as long; alar quadrate to transversely oval, in about 4 rows, extending well up the margins and passing to oval-oblong; dioicous; perichetial bracts oblong-lanceolate, acuminate, striate-plicate, inner subvaginant; pedicel smooth, flexuous, about 1 cm. long; capsule straight, erect or inclined, oblong-subcylindric, tapering at base; urn 2 mm. long, 0.7 mm. wide, brownish; teeth reddish, incurved when dry, lanceolate, confluent at base, finely striate below, rugulose above, divisural line distinct, ventral surface lamellose; endostomial band strongly reticulated, about one-fourth the length of the teeth; segments narrow, concave keeled, hiant, about as long as teeth; cilia none; annulus of two rows of pellucid cells, shed with the operculum; operculum conic, straight or obliquely beaked; calyptra cucullate, reaching to the base of the capsule; spores smooth, 10-13 μ wide, mature in summer. On rocks and rotten wood. (Plate 16, Figs. 55-68.)

TYPE LOCALITY: Montana; type collected by Mr R. S. Williams, on Tenderfoot or Belt Mountains, Sept. 9, 1891; now in the Herbarium of the New York Botanical Garden; also collected by Mr. Williams at Columbia Falls, Mont., and by Prof. Holzinger in Minnesota.

In general appearance *L. Williamsi* resembles the smaller forms of *L. tectorum*, from which it differs, however, by its narrower, longer acuminate, often serrate leaves, its longer median cells, its broader, strongly reticulated endostome and its striate-plicate perichetial bracts. Named in honor of my friend Mr. R. S. Williams.

(5) ***Leskea Williamsi filamentosa* Best.**

In thin loosely spreading or somewhat intricate tufts, pale green pass-

ing to yellowish green or reddish brown; stems prostrate, defoliate or with a few rudimentary leaves, sparingly branched; branches filiform, diffusely spreading, 2-5 cm. long; branchlets flagellate, brittle, broken when dry; larger branch-leaves narrowly ovate-lanceolate, long-acuminate, erect, not plicate, entire or serrulate above, 0.15-0.2 mm. wide, 0.3-0.5 mm. long; costa thin, commonly marked by 3 or 4 rows of enlarged cells, disappearing below the middle; leaf-cells smooth, clear, not uniform; median cells oval-rhombic to linear-rhomboidal, 2-4 times as long as wide; alar quadrate, in 3 or 4 rows; leaves of branchlets similar, smaller, sometimes rudimentary; sterile.

Type of variety collected by Mr. L. F. Anderson on rocks near Lahoon, Idaho. Drummond's Musci Americana 219, in part; Brandegee's Mosses of Southern Colorado¹38.

This delicate little moss appears to have been a standing puzzle for several years. It was found in some of the sets of Drummond's Musci Americana No. 219, but not in all, and was distributed as *Hypnum catenulatum*. Some of the other sets of this number, but not all, contained *Heterocladium heteropteroides filescens*, a moss it closely resembles, but which differs in being papillose. Some years ago Mr. Gepp sent me from the Natural History Museum in London a portion of one set of Drummond's 219 bearing the name of *Hypnum graveolens* Wils. It therefore appears that so good an authority as Wilson had discovered that the moss in question was not *Leskea catenulata* (Brid.). Subsequently Mrs. Britton gave me some specimens of Brandegee's No. 38, which I named *Heterocladium heteropterum fallax* Milde? A careful study of Drummond's 219 and Brandegee's 38 made it obvious that we had to deal with an attenuated form of some species which under more favorable conditions grew better developed.

(6) ***Leskea tectorum flagellifera* Best.**

In somewhat dense compact tufts, pale green to yellowish-brown; stems prostrate, pinnately branched; branches filiform with numerous flagellate deciduous branchlets; stems defoliate, rarely with rudimentary leaves; branch-leaves as in type but usually much smaller; leaf-cells smooth, clear, oval-rhombic; leaves of branchlets very small, 0.05-0.1 mm. wide, 0.1-0.2 mm. long. Differs from *L. Williamsi filamentosa* by its entire leaves and larger leaf-cells. Type of variety collected by Mr. R. S. Williams at Columbia Falls, Montana, Sept. 5, 1895; found also by Professor Holzinger in Minnesota. It usually grows on rocks and rotten wood.

The North American *Heteroleskeae* differ from the European by being usually more markedly proliferous. The somewhat dense tufts of var. *flagellifera* are mostly flagellate branchlets which when dry readily separate from their attachments. By soaking these tufts and dissecting out the stems and branches leaves may usually be found sufficiently developed to make possible the identification of the plants.

(7) ***Leskea graciliscens* (Hedw) Best.**

L. graciliscens is quite common and widely distributed, ranging through the Eastern, Middle, Northern and Western States, rare in Canada and in the Southern States and absent west of the Rocky Mountains. It differs from the closely related *L. polycarpa* by its smaller straight leaves which are shorter and comparatively broader, usually gradually acute and blunt

pointed, and by its shorter, often unequal segments. In some of its forms it approaches *L. polycarpa*, in others *L. obscura*, without however fitting either as a variety. In general terms it may be said that all those doubtful forms that plainly do not belong to either of these species should be referred to *L. gracilescens*, which moreover has priority over the last.

(8) ***Leskea tectorum*** (A. Braun) Best.

Widely distributed and quite variable, *L. tectorum* is usually easily recognized when once understood. Its leaf-cells, broad, plump, rounded, glassy, furnish its most distinctive character. Its leaves are quite like those of *Amblystegium adnatum* but some what smaller. This differs, however, in having its leaf-cells longer and narrower, especially in the upper part of the leaves, so that no difficulty need be experienced in discriminating between the two species. The closely allied European *Leskea catenulata* (Schwägr.) Brid., undoubted specimens of which have not as yet been reported from North America, may be known by its narrower, longer and thicker costa, usually reaching the middle and not forking, and by its thick-walled leaf-cells.

The type of *L. Wollei* Aust. has been compared with European specimens of *L. tectorum*, with the result of finding them nearly or quite identical. While the median leaf-cells are slightly longer, sometimes more rhomboidal than in the ordinary forms of this species, the same variations occur in foreign specimens. The cotype of *Pseudoleskea malacoclada* C. M. & K., through the kindness of Prof. Macoun, has likewise been seen and carefully examined. Although it is slightly stouter and the basal margins of the leaves are more commonly recurved, it differs in none of the essentials from the specific type of *L. tectorum*.

Rosemont, N. J.

BIBLIOGRAPHY—T. P. JAMES.

In response to a request to supplement the article on Thomas P. James by a list of his writings, Mrs. Gozzaldi writes the following under date Oct. 8, 1903. "My father was so much taken up with the study of Bryology and his work in the Horticultural and Pomological Societies that he wrote very little outside these lines for publication. I will add what I can think of to these." Then follows: Life of William Darlington, M. D.; "Anophytes" in Darlington's Flora Cestrica; Flora of Delaware Co., Pa. in Dr. George Smith's History of Delaware Co.; The Journal of Pursh the Botanist, Edited and Published by T. P. J.; "Anophytes" in Smithsonian Report of Flora of Alaska, by J. T. Rothrock; "Mosses" in Vol. V, Clarence King Surveys, and the Manual of the Mosses of North America in connection with Lesquereux.

A. M. S.

MOUNTING MOSSES.

CORA H. CLARKE.

The answer to the question as to what is the best way to arrange mosses depends somewhat on the purpose of the collection and how it is to be used.

I am constantly needing to examine my mounts and compare new finds with those I already have, and I could not manage with mosses tucked away in envelopes or packets. I prefer an open-faced collection, and to attach the pressed mosses to paper I always use a solution of gum tragacanth, being so directed by that learned and kindly bryologist, Thomas Potts James, to whose generous help I owe so much. He recommended the use of gum tragacanth, because it is so absolutely colorless, that it never shows on the paper—the moss has the effect of being fixed, like a seaweed, by its own gluten. One must buy the purest quality of gum tragacanth, and discard all stained pieces. It takes very few pieces to make a fair sized bottle of the prepared material, and even then the gum is of the consistency of jelly. I spread it on the pressed moss as if I were buttering a piece of bread; and then lay the moss on the paper, wiping off all that spreads outside, placing under light pressure until dry. One must use care not to let any stray grains of earth mix with the gum, for it will affix them as firmly to the paper as it does the moss. Mr. James used a few drops of oil of lavender to prevent the prepared gum tragacanth from molding, but I have not always found it effective, and now I prepare first a saturated solution of boracic acid in water, and then dissolve my gum in this solution, in consequence of a hint derived from an article by Rodney True, on The Prevention of Mold on Cigars, in *Science*, July 18, 1902; an article to which I am much indebted.

Although I mount nearly all my mosses on herbarium paper, or paper similar in weight and quality, I use paper of different sizes, and have six different methods according to the purpose for which the collection is intended.

1. This method hardly deserves the name, it is only a sort of moss-diary. When I go on a particularly prolific prowl, I gum scraps of all the mosses I find onto a single sheet, giving date and locality, and calling it "a Record Sheet." I often do the same with sea-weeds. They do not make herbarium specimens, but only a sort of collecting journal, and often convenient to refer to.

2. For a handy and popular set, to sell at fairs or give to friends, I select mosses with especially characteristic and contrasting forms, stiff and graceful, dark and light, erect and trailing, and most especially those which rejoice in popular names, like Broom-Moss, Four-tooth Moss, Twisting Cord Moss, Urn Moss, Peat Moss, Brook Moss, Fern Moss, etc., and mounting a nice specimen of each on a sheet of paper about 5 x 8 inches, tie these sheets together in booklets of twenty or thirty leaves, each having a cover of gray card board. People who have never studied mosses are amazed at the number of different forms that can be found in their own woods.

3. When making a set of the mosses of some particular town or village,

to deposit in the Public Library of that town, I use a scrap book with fair white leaves, gumming the mosses directly onto the leaves, and writing in the names. One cannot make up such a set, however, until one knows pretty well how many and what kinds one is likely to find, so as to know how to group them. A beginner should have a method allowing for the growth of the collection and its rearrangement, and for the insertion of new finds among the former ones, and of new forms of species already placed in the collection.

4. My own special herbarium is on half-size herbarium sheets, those being easier to handle and examine than the full-sized sheets. If the moss is large, it is mounted directly on the sheet, indeed, there may be several sheets to one species; if small, it is mounted on a 4 x 5 or 5 x 8 paper, and the paper pinned onto the larger sheet with small pins (these pins, Kirby Beard & Co., are only half an inch long, and can be bought at small-ware counters). The use of these small pins allow one to add new mounts, or rearrange the old ones, at will. This collection can grow to any extent.

5. In arranging my local or *Magnolia* collection, which I keep in the summer cottage, I am cramped for room, and here I economize space by mounting all my mosses directly on the half-size sheets, and where the moss is small, like most of the *Bryums*, or *Ditrichums*, I gum several species on one sheet, though the *Fontinalis* and *Sphagni* require a sheet, for each species.

6. In preparing mosses to present to any institution not cramped for space, I use full size herbarium sheets, and of course but one sheet to a species, and I try to have each species represented by many specimens; for instance, one to show it as it grows, another carefully picked out to show the branching; one to show it growing clear and clean by itself; another, mixed with other mosses: one to show the sporophytes starting, and the next, the swelling fruit; the third shows the ripe fruit dropping caps and lids, and finally, one shows the old fruit with the empty spore-cases; each of course has exact date and locality given, and if possible the same moss is secured from various localities, to show range of distribution, and also variations in growth. And on every sheet is gummed an envelope, plentifully filled with plants, which can be taken out and studied. Such an open-faced collection as this is meant to be freely handled and examined. I admit that rare or valuable mosses must be protected by being in packets or envelopes, and if there is any doubt about the species, a specimen must not be gummed onto a sheet with other specimens. Such doubtful plants can be given a sheet to themselves, or else provisionally placed in pin-attached packets, which can be easily transferred elsewhere, when new revelations as to their affinities occur. Mr. Chamberlain's method of folding his packets is like that which Mr. James taught me, except that I think Mr. James folded his oblong paper, exceptly in the middle, making his top fold double. He then creased the ends backward and under, as Mr. Chamberlain describes, thus holding the upper flap taut and firm.

Boston, Mass.

REVIEW OF MOSSES WITH HAND-LENS AND MICROSCOPE.

By JOHN M. HOLZINGER.

Part I of this work appeared in June of the present year. It is published by the author A. J. Grout, Ph. D., at 360 Lenox Road, Brooklyn, N. Y. It aims to be "a non-technical hand-book of the common mosses of the northwestern United States."

It is a pleasure to note at the outset that the paper, the printing, and the figures and plates, all, are excellent. In addition to numerous original figures many of the full-page illustrations for families and genera are reproduced from Bruch & Schimper's monumental work, *Bryologia Europaea*, and from Sullivant's *Icones*. The chapter on life history and structure is especially well illustrated with plates and figures reproduced from Schimper's "*Recherches sur les Mousses*." The illustrations of the glossary include numerous original additions to Dixon & Jameson's *Handbook of the British Mosses*, which is also followed in the system of classification adopted by the author. Since all of these works are either inaccessible to the majority of our moss students or else are too expensive, the reproduction of these illustrations is an especially valuable feature for all for whom this handbook is intended. These include not only all our moss students remote from the larger universities, the libraries and herbaria of which afford the best opportunities, but also all teachers of botany who, while they may not wish to take up bryology as a specialty, have yet offered them in this work the ready means of understanding this most fascinating group of plants somewhat more fully than the current general manuals of botany make possible. To them the excellent diagnostic characters of families and genera, drawn from the author's own working experience, will be a most welcome aid in distinguishing the more common genera.

The first part consists of eighty-six pages of printed matter and plates; the latter, like the smaller figures, are printed in with the text, and are paged continuously with the printed pages. The first forty-six pages take up in different chapters the discussion of classification principles, the collection of mosses, mounting, methods of manipulation in their study, life history and structure, and the illustrated glossary. The manual proper begins with page 47, the Key to the Families of Mosses occupying the next three pages. In the pages following the attempt is made to enumerate and describe all the mosses of the region covered. Doubtful or doubtfully identified forms have been advisedly omitted.

All in all, this is the best elementary manual of mosses in any language, considering both print and illustrations, it is certainly the first illustrated manual offered to our young American Bryologists. Two keys will be given at the end of the work, one for the fruiting mosses and the other for the sterile ones.

Winona, Minn.

SULLIVANT MOSS CHAPTER REPORT ON VOTE.

Twenty-five votes were cast in response to the Note to Chapter Members in the September BRYOLOGIST. All were in the affirmative, therefore, the four points outlined are adopted. ANNIE MORRILL SMITH.

NOTICE—ELECTIONS.

Forward your ballot *at once* to Miss Edith A. Warner, 19 Schermerhorn street, Brooklyn, N. Y., Judge of Elections. Polls close December 1st.
For President.—Prof. John M. Holzinger, Winona, Minn.
For Vice-Pres.—Mrs. Carolyn W. Harris, 125 St. Mark's Avenue, Brooklyn, N. Y.
For Secretary.—Miss Mary F. Miller, 1109 M street, N. W., Washington, D. C.
For Treasurer.—Mrs. Annie Morrill Smith, 78 Orange street, Brooklyn, N. Y.

A CORRECTION.

In the last BRYOLOGIST (September) on p. 90, under the mosses offered by Mrs. M. L. Stevens, the statement that *Hypnum vernicosum* Lindb., had not before been reported from New England is an error. Our attention has been called to two stations, see Vt. Mosses; Grout, p. 30. Five stations are also reported for *Bryhnia Novae-Angliae* in New England. A. M. S.

NOTICE.

Membership in the Sullivant Moss Chapter for 1904, and Part I. of Dr. Grout's new book, "Mosses with Hand-Lens and Microscope," and a copy of his "Vermont Mosses, with Keys," can be obtained by sending \$2.00 to Dr. A. J. Grout, 360 Lenox Road, Brooklyn, N. Y., *before* Jan. 1st, 1904. This special offer is made for two months to hasten the sales of "Mosses with Hand-Lens and Microscope" so that Part II., which is ready for the printer, may be printed soon.

NOTICE.

The undersigned will issue in fascicles of twenty-five numbers, "Musci Acrocarpi Boreali Americani" at \$1.50 a fascicle. Contributions from collectors are solicited and will be generously paid for. Not over twenty-five sets will be prepared. Subscriptions solicited. Address

PROF. JOHN M. HOLZINGER,
Winona, Minn.

OFFERINGS.

[To Chapter Members only—for postage.]

- Miss Alice L. Crockett, Camden, Maine. *Amblystegium Lescurii* (Sulliv.) Aust. c.fr. *Dicranum flagellare* Hedw. c.fr. *Polytrichum commune* L. Doubly fruiting. Collected, Camden, Maine.
- Mrs. S. B. Hadley, South Canterbury, Conn. *Thelia hirtella* (Hedw.) Sulliv. c.fr. *Mnium sylvaticum* Lindb. c.fr. *Cirriphyllum Boscii* (Schwaegr.) Grout. Collected, South Canterbury, Conn.
- Mr. C. B. Robinson, New York Botanical Garden, Bronx Park, New York City. *Fissidens osmundoides* Hedw. *Dichelyma capillaceum* (Dill.) Schimp. *Tortella fragilis* (Drumm.) Limpr. = *Barbula fragilis*, B. & S. Collected in Nova Scotia and Cape Breton. Limited supply of last two.
- Miss Mary F. Miller, 1109 M. St., N. W. Washington, D. C. *Hylocomium parietinum* Lindb. c.fr. Collected, Shandaken, N. Y.
- Mr. N. L. T. Nelson, 3968 Laclede Ave., St. Louis, Mo. *Leptobryum pyri-forme* (L.) Wils. c.fr. Collected. in Minnesota. *Catharinea angustata* Brid. c.fr. Collected in Missouri.
- Miss Harriet Wheeler, Chatham, N. Y. *Fontinalis antipyretica* L. str. *Plagiothecium undulatum* B. & S. c.fr. *Neckera Menziesii* Drumm. c.fr. Collected in New Westminster, B. C., by Mr. A. J. Hill.
- Miss Annie Lorenz, 96 Garden St., Hartford, Conn. *Camptothecium nitens* Schimp. c.fr. Collected in Willoughby, Vt.
- Mrs. R. H. Carter, 37 Church St., Laconia, N. H. *Weissia ulophylla* Ehrh. c.fr. *Umbilicaria flocculosa* Hoffm. Collected in Laconia, N. H.

